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CANADIAN GEOGRAPHICAL JOURNAL

CONTENTS

DRACULAS OF THE GREAT LAKES
SAN BLAS INDIANS OF PANAMA
MOOSONEE AND MOOSE FACTORY • MOROCCAN VISIT
STEVENSON FIELD—WINNIPEG'S MEMORIAL AIRPORT
WILDERNESS PARK—LAKE SUPERIOR

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CANADIAN GEOGRAPHICAL JOURNAL

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CONTENTS

JULY, 1957 ✦ VOLUME LV ✦ NUMBER 1

COVER SUBJECT:—*Control workers use dip-nets and portable electric shockers to collect lamprey larvae.*

Page

DRACULAS OF THE GREAT LAKES . . . 2
by F. H. WOODING

SAN BLAS INDIANS OF PANAMA . . 14
by RICHARD HARRINGTON

MOOSONEE AND MOOSE FACTORY . . 24
by FRED BRUEMMER

MOROCCAN VISIT 30
by C. P. M. ROBERTSON-FORTAY

STEVENSON FIELD — WINNIPEG'S MEMORIAL AIRPORT 38
by FRANK ELLIS

WILDERNESS PARK — LAKE SUPERIOR . 42
by ADELAIDE LEITCH

EDITOR'S NOTE-BOOK V

THE TRAVEL CORNER VI

AMONGST THE NEW BOOKS VIII

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Empty fish boxes on the wharf at the end of a trip on Lake Huron account for the concerned expressions on the faces of these fishermen.

Draculas of the Great Lakes

by F. H. WOODING

ARCHIE BAIN, Lake Huron commercial fisherman, brought his gill-netter to a smooth stop alongside other craft at the Meldrum Bay wharf on Manitoulin Island. Gloomily, he left the wheel-house and began preparing his boat for a stay in port.

"Just about a dead blank", he reported. "A few lake trout, some whitefish. They don't even pay for the gas and oil. I tell you, the lampreys have ruined the Great Lakes fishery. Time was when a man could load his boat in one day at sea. We'll never see the likes of that again."

The complaint of this doughty fisherman, eighteen years in the business with a much longer family association in the same occupation, was not merely the characteristic grumbling of men of his kind. It was a sad statement of fact — a statement long since verified by the commercial fishermen in Lake Ontario, more and more heard from their counterparts in Lakes Huron and Michigan, and now all too frequently made by the fishermen of Lake Superior.

For the cold, hard truth, borne out by carefully compiled Canadian and American statistics, shows that the once huge and profitable trout fishery is virtually a thing of the past in all of the Great Lakes except Superior. The speed and completeness of the collapse has been caused mainly by the ravages of sea lampreys. Lake Superior, the most westerly of the lakes, still supports a sizeable trout fishery only because the lampreys have but recently established themselves there.

As a consequence, what a little more than twenty years ago was a business producing 17,000,000 pounds of trout worth, at today's market prices, close to $7,000,000, is now an increasingly uncertain gamble yielding only 5,000,000 pounds with a market value of $2,000,000. And perhaps just as important, it

is sad news for the thousands of fish fanciers on both sides of the border who relish lake trout as one of the most delicious of all fish foods. On the other hand, lake trout are not the only fish suffering from the ravages of these fresh-water Draculas, for lampreys have made disastrous inroads into stocks of whitefish, another commercially important species, and are taking their toll of lake herring, rainbow trout, suckers, yellow walleye and smallmouth bass.

To the Canadian Department of Fisheries and the Province of Ontario, and to the United States Fish and Wildlife Service and the eight states bordering the Great Lakes, combating the lampreys is a mammoth challenge. In some respects it is much more complex and difficult than were the problems of restoring the great sockeye salmon runs of British Columbia's Fraser River and the halibut of the North Pacific — problems that have been overcome and that are, in fact, now hailed throughout the world as outstanding achievements in fisheries rehabilitation.

So serious is it that in 1955 Canada and the United States signed an international agreement and, through a recently established body known as the Great Lakes Fishery Commission, have begun an urgent, high priority programme of co-ordinated research and control. Top fishery scientists of both countries, backed by a budget for this year of about $1,500,000, are literally working round the clock to find means of destroying the scourge. But even if effective weapons are found, it will be five or six years after their application before restoration of the resource begins to take place.

Field headquarters in the fight to save the lake trout and whitefish of Lake Superior. Camp established on the north-eastern shore of Lake Superior by the Fisheries Research Board of Canada for lamprey control workers.

Photograph taken at the control camp shows a lamprey attached to a lake trout, just as they were taken from the water.

Meanwhile, with the lake trout at an economically low level in all of the Great Lakes except Lake Superior, the lampreys will continue to do great damage. In Superior itself, where the average annual catch from 1946 to 1950 was 4.5 million pounds, declines have become suddenly alarming.

Dr. W. A. Kennedy, a senior scientist of the Fisheries Research Board of Canada, who is directing the Canadian investigations, holds out little hope for Superior's immediate future. "Even with the best of luck," he states, "it is unlikely that a method can be devised and put into operation early enough to prevent Lake Superior production from dropping to a million pounds of trout per year."

When that happens, most fishermen there will have to cease operations.

Dr. James W. Moffatt of Ann Arbor, Michigan, Chief of the Great Lakes Fisheries Investigations of the United States Fish and Wildlife Service, is even more pessimistic. He believes that if reproduction rates typical of those of the lower lakes apply, the lampreys will destroy the lake trout fishery in Lake Superior within the next two or three years.

The killing strategy of the lamprey is a fiendishly devised system of slow death for its victim. Eel-like in appearance, with a smooth, scaleless body which attains a maximum size of two feet in length, its weapon is its disc-shaped, sucking mouth. A vigorous swimmer, it attaches itself to its quarry and with its strong, horny teeth and rasping tongue soon penetrates through the scales and into the flesh. There it remains until either the fish dies from depletion of its body juices or the lamprey itself becomes glutted. Invariably, a fish freed of the parasite carries a large, unpleasant-looking scar and has little market value.

Why the lampreys should exist at all is one of

nature's mysteries. They have no known natural enemies to keep them under balanced control and so far their own economic value, aside from small yields of low potency vitamin A used by biological supply houses, is practically nil. Although in a number of European countries lampreys are highly esteemed as food, they have yet to become popular in North America.

The sea lampreys, known to scientists as *Petromyzon marinus*, are primarily marine creatures with anadromous habits. That is, they are hatched and spend their early lives in fresh water, migrate to the ocean where they grow to maturity and then return to fresh water to spawn. Like certain other anadromous fishes, notably the Pacific salmon, they die soon after spawning. They are common in many parts of the world, and have long been known along the Atlantic seaboard.

No one knows when the sea lampreys succeeded in adjusting themselves to an entire life cycle in fresh water, but because they are primitive creatures this adjustment probably took place many years ago. In any case, they have long been native to the St. Lawrence River, Lake Ontario, and some lakes of northern New York.

The invasion of sea lampreys beyond Lake Ontario was effectively blocked by the height and force of Niagara Falls, but when the original Welland Canal was completed in 1829, a new migration route was opened.The lampreys were slow to take advantage of the canal, however, and it was not until 1921, nearly a century later, that fishermen became aware of their presence in Lake Erie. Unsuitable spawning conditions, and the fact that Lake Erie is a shallow lake that does not support significant numbers of deep-water fish such as lake trout, offered little attraction to the lampreys and

Canadian and United States experts have joined forces to rid the lakes of the sea lamprey. George R. Clark, Deputy Minister of Fisheries of Canada, is shown addressing the organizational meeting of the Great Lakes Fishery Commission at Ottawa, 23 April 1956. Lamprey control is one of the commission's first major tasks.

Point of entry for the first lamprey invaders of Lake Superior: the canal locks at Sault Ste. Marie, Ontario. Some of the lampreys made the journey attached to the bottoms of west-bound vessels.

Left:—Frogmen prepare to check the hulls of ships and the walls and gates of the locks to find out how many of the predators are finding their way into the last stronghold of the lake trout and whitefish in the Great Lakes system.

so most of them quickly moved on to Lake Huron. Virtually complete destruction of the Lake Huron trout fishery followed, the combined Canadian-American catch dissipating from a total in 1939 of 4,500,000 pounds to less than 350,000 pounds in 1953. Destruction on the Michigan side of Lake Huron was heaviest, the catch there dropping from 1,372,000 pounds in 1939, to a mere 25 pounds in 1951 — about the weight of two average trout.

While stocks of lampreys consolidated themselves in Lake Huron, other schools moved on to Lake Michigan. There they went to work with incredible speed and, during the six-year period from 1945 to 1951, the commercial catch of trout dropped from 5,400,000 pounds to 11,000 pounds. In that lake complete destruction of trout is inevitable.

Any belief that the Soo rapids and the Soo locks would block the ascent of the lampreys into Superior, the last of the Great Lakes, was soon dispelled. To the lampreys the journey was easy. Many of them simply attached themselves to the bottoms of ships going through the

locks and hitch-hiked a ride. Their presence in Lake Superior was first discovered in 1945 and since then they have succeeded in establishing themselves in tremendous numbers in the extreme eastern end. Evidence of their spread to other parts of the lake, however, is now certain.

The war against the lampreys is one of the most concentrated and urgent tasks ever undertaken by Canadian or United States fishery authorities. And time is on the side of the enemy.

To date it has been largely a probing attack, experimenting with numerous devices to find the weak spot in the lampreys' armour. And since the lampreys have won hands down in all of the Great Lakes but Superior, it is in that area that the major campaign is being waged. No longer, however, is it an unco-ordinated effort, for through the International Great Lakes Fishery Commission all efforts are being directed by what, in effect, is a "strategic command". When victory has been achieved in Superior the line of battle will swing to Lake Michigan, then on to Lake Huron. After that will come the big task of rehabilitating the resource, with the war continuing in Lakes Erie and Ontario.

But the battle will never be completely won; for even though the lakes may become relatively free of the pest, impenetrable front lines will have to be established at many places along the water system to prevent re-infiltration.

At the outset, fishery scientists working on the problem realized that control measures could not be devised until there was full knowledge of the parasite itself. And so concentrated biological studies were undertaken on both sides of the lakes to supplement existing information.

Sea lampreys, it was found, move in great numbers in late spring and early summer into tributary streams to spawn. These upstream migrations take place mostly at night, the heaviest runs occurring when the water temperature reaches about 50°F. Seeking out a gravel or rubble bottom with a moderately strong current, the males and females pair off and build half-moon-shaped depressions with the open sides facing the current. The lampreys move the stones by seizing them in their mouths and then placing them in position. When all is in readiness the male and female then move slightly ahead of the nest, and the eggs from the female, which are immediately fertilized by the male, are carried by the flow into the pockets where they remain until they hatch about two weeks later. Meanwhile, the parent fish drop back with the current and soon die. A female lays an average of 65,000 eggs.

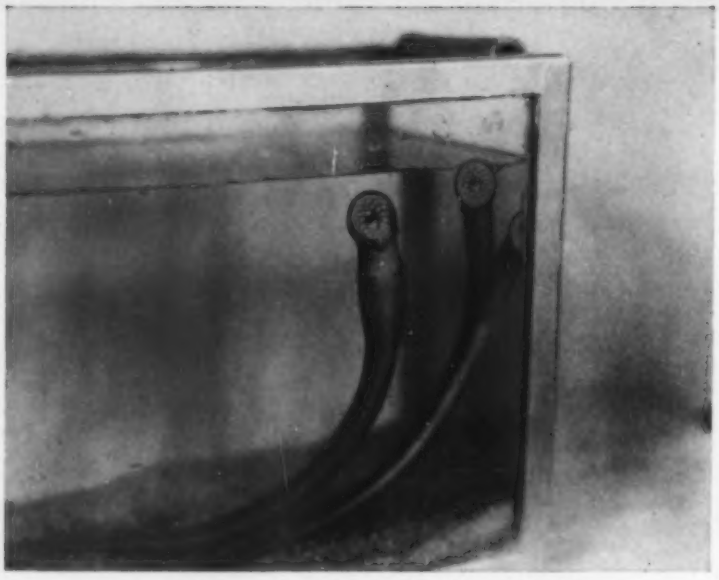
The young lampreys, known as *ammocoetes*, drift downstream a few days after hatching and burrow themselves in muddy or soft sand bottoms. Here they remain for four or five years, obtaining their nourishment from microscopic animals which they strain out of the water and mud.

During this long period of relative inactivity, the *ammocoetes* are slender, curious-looking creatures in no way resembling the animals they are to become. But transformation takes place quickly, and just before they are ready for the open lakes they undergo remarkable body changes. Now they look like lampreys, with the hideous sucking mouth and mass of small, wicked teeth. At this stage, they are about the length and size of a lead pencil. Migration takes place at the time of the spring break-up, during high water, although movements do occur during the late fall and at various times during the winter.

The new lampreys stay in the big lakes anywhere from a year to eighteen months before maturing and returning to the streams to spawn. It is during this relatively short period of their lives that they carry out their destruction of fish stocks. Biologists believe that they spend the first months of their lake life in deep water where they attack trout and other deep-water fishes, and as they grow older they move shoreward where they prey on rainbow trout, bass and other shallow-water species.

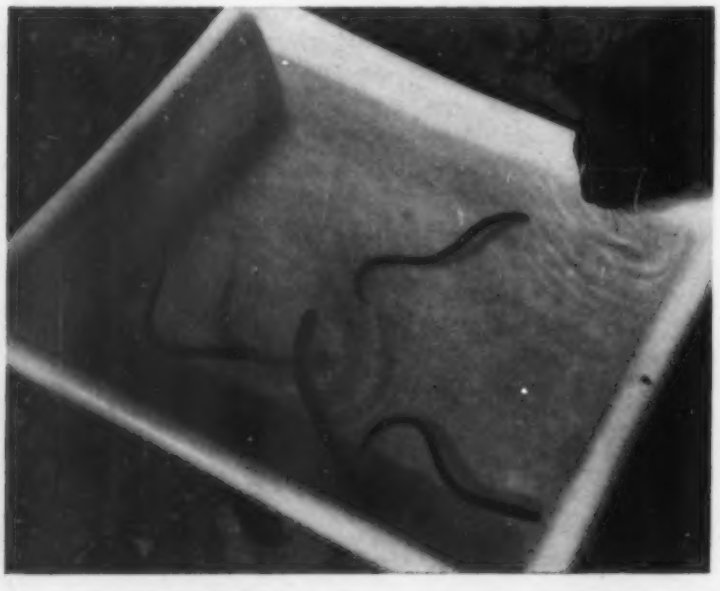
With this knowledge to guide them, the scientists then turned to laboratories, setting up, at the same time, a number of field stations where on-the-spot control experiments and other research could be carried out. Meanwhile, there were repeated reminders of the urgency of the problem.

In Lakes Huron and Michigan scores of fishermen began hauling in their gear and look-



The oral discs, showing the teeth of the killers. Captured lampreys in a tank at the Ontario Department of Lands and Forests laboratory at South Bay Mouth, Manitoulin Island.

Control worker shows size of lamprey nest in the gravel bed of the Chippewa River, tributary to Lake Superior.



ing for other jobs. Operators at New York's Fulton Market and fish brokers in Toronto, Montreal, Chicago and other large centres began getting stock replies to their telegraph and telephone inquiries — no lake trout to be had. For the first time in memory trout from the Great Lakes practically disappeared from retail stores and became a rare item on the menus of hotels, restaurants and railway dining cars. Sports fishermen, who had long enjoyed hooking fat, fighting trout with light tackle, gave up in disgust and many charter boats and outfitters went out of business.

The collapse of the Great Lakes fishery put sudden pressure on the suppliers of fish from such far northern lakes as Athabasca and Great Slave. In January 1952, demand for freshwater fish from Canada was particularly acute and New York buyers, unable to get trout from any source, ordered a special consignment of whitefish from suppliers at Hay River, Great Slave Lake. The fish were moved by refrigerator-transport in a 3,200-mile mid-winter run of five days. The whole load was sold a few hours after its arrival in New York. Similar shipments were later made to Chicago.

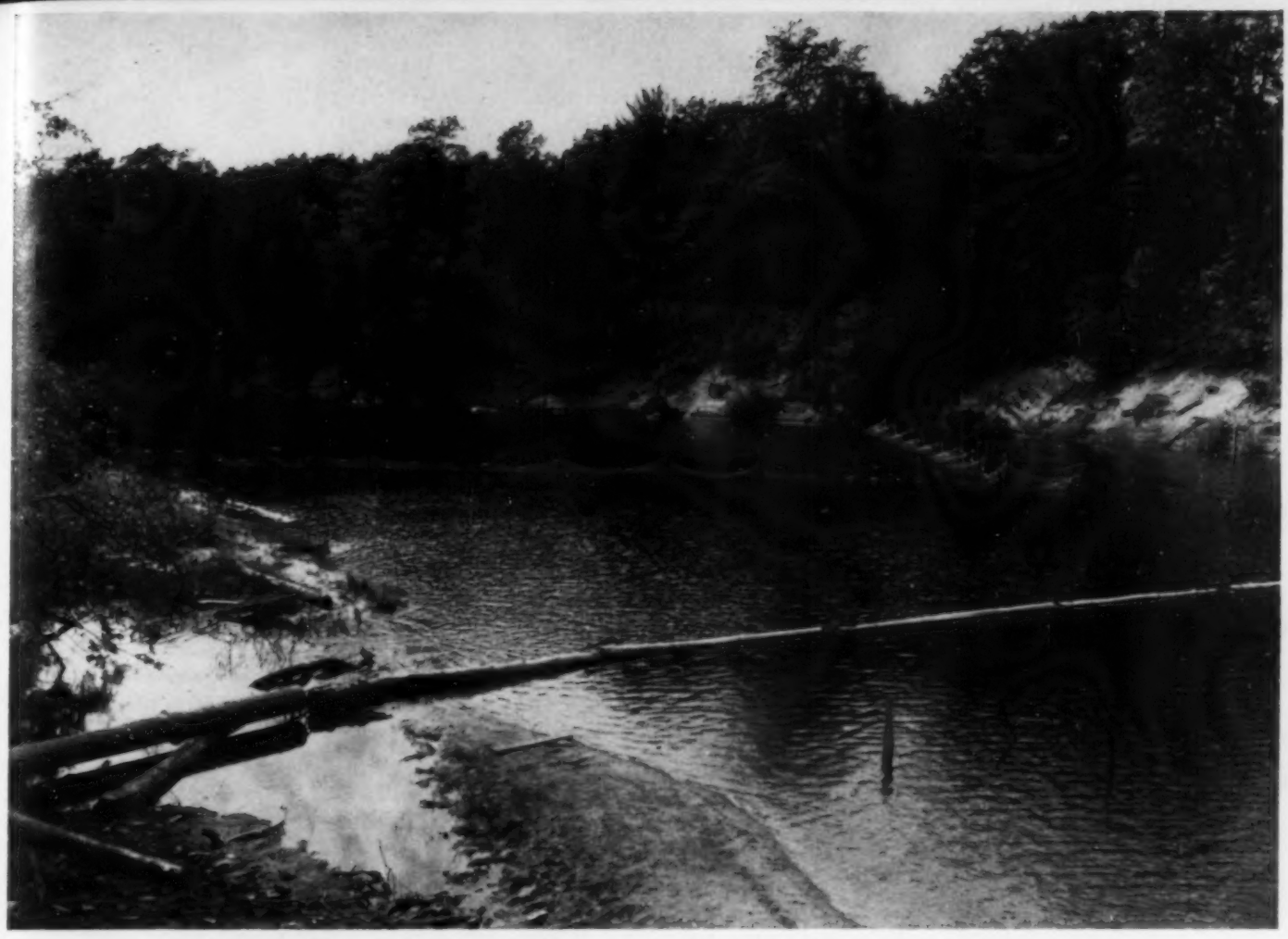
While the Canadian and United States scientists were well aware of the tragedy hitting the Great Lakes they knew, too, that they could not be hurried. The war against the lampreys would be long, complicated and frustrating.

Although without the benefit at that time of an international commission to co-ordinate the work, they established at the outset a close exchange of information and ideas. Of particular importance was their unanimous agreement on where the main frontal attack should be made. In theory, it was simple: stop the lampreys from spawning.

Dr. Vernon C. Applegate, research biologist with the Institute of Fisheries Research of the Michigan Department of Conservation, who joined the United States Fish and Wildlife Service when the Federal Government took over the lamprey studies on the United States side, played a major role in developing the control device most widely in use today — the electric barrier.

This barrier, since adapted for use on the Canadian side of the lakes, is costly to build

Laboratory kitten at Sault Ste. Marie investigates young lampreys being held in tray for study.



Net stretched across Batchawana River, downstream from lamprey barrier, to prevent game fish from entering electrical field. Fish are taken out of trap and released above barrier.

and to maintain. But results from its use have been encouraging and at present offer the best hope of carrying out mass destruction of the enemy.

Consisting of a series of electrodes running diagonally across a stream, and sending out 110 volts of alternating current, the barrier creates an electrical field which stuns and sometimes kills lampreys entering it. These are collected each day and destroyed. An interceptor trap set some distance downstream from the barrier prevents migrating game fish, such as rainbow trout and pickerel, from reaching the electrical field. These fish are collected daily and released well up stream from the barrier to continue their journey unharmed.

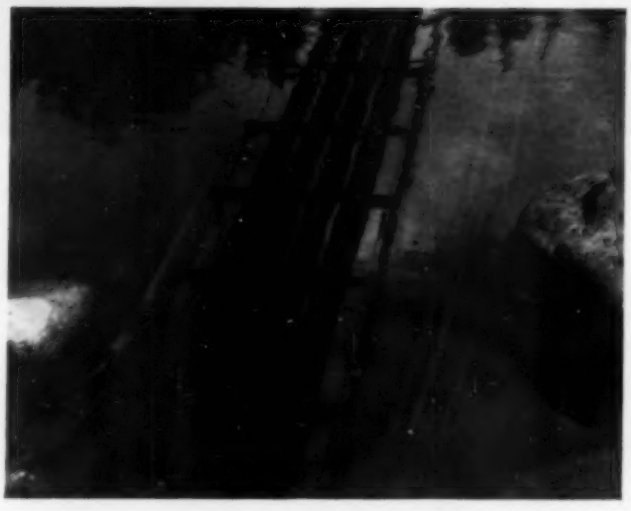
To be fully effective, however, barriers of this kind are required for every stream known to be inhabited by lampreys. Since there are many hundreds of them and since the barriers cost an average of $10,000 each to construct, with maintenance charges extra, the cost of the complete coverage planned will run into several millions of dollars.

At the present time a total of seventy-one barriers are in operation in Lake Superior, thirty-seven in Lake Michigan and two in Lake Huron. Plans of the International Commission call for the erection of nearly 100 more this year.

Downstream net below barrier on Pancake River, another stream to Lake Superior.

Electrical ground-type barrier installed under foot-bridge across Batchawana River.

Barrier shown as it enters the water under the Batchawana foot-bridge.

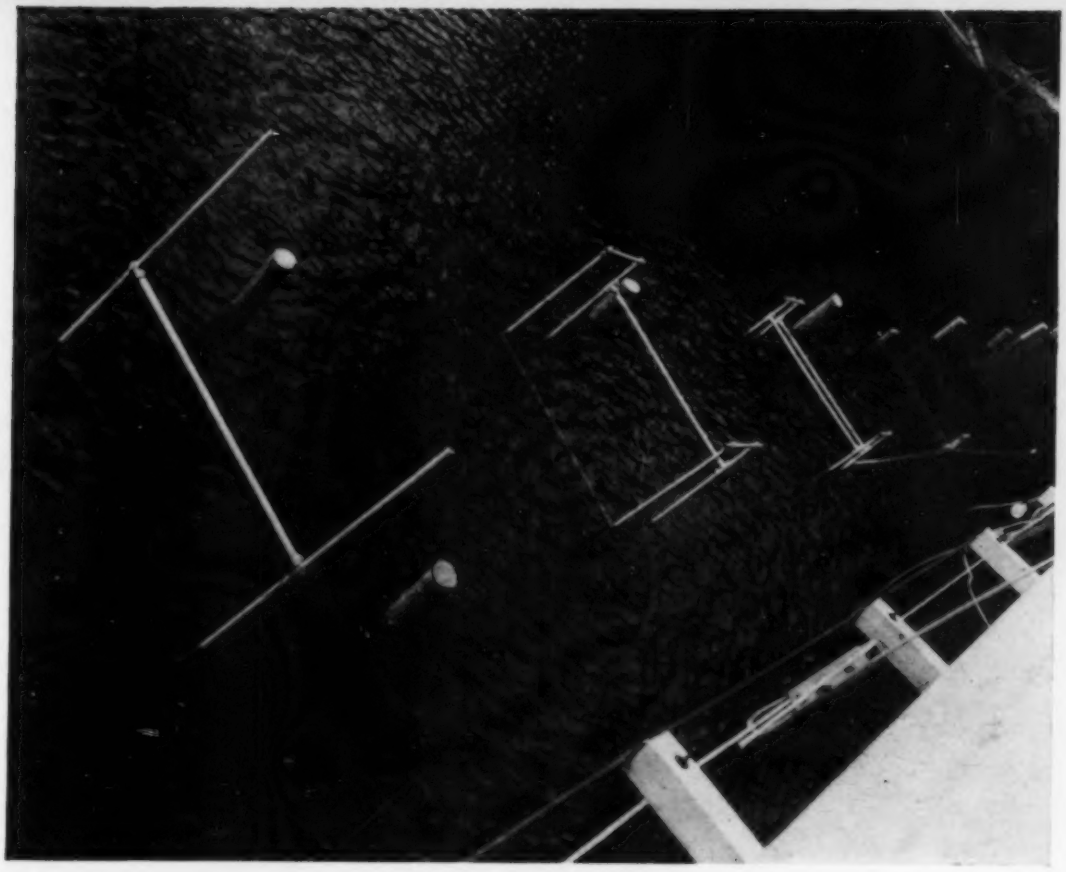


While the electric barriers are the main instruments of control, other devices are in use or are under study. Smaller streams have been equipped, for example, with mechanical barriers such as trap nets and curved-lipped dams. In a number of short-run streams, or streams blocked by waterfalls over which lampreys cannot pass, gravel beds have been bulldozed or covered with a layer of concrete to make them unusable as spawning grounds. Application of these two methods, however, is limited either because of the isolated location of many of the streams or the lack of access roads to them.

One sure method of lamprey destruction is the use of toxicants. But the poisoning of streams thus far has been costly, and great care in application is required to ensure against possible damage to game fish as well as to wild and domestic animals using the streams. Nevertheless, the possibilities of toxicants are being given the closest study.

Dr. Moffatt told the International Commission's organizational meeting in Ottawa last year that United States experts had already experimented with over 5,000 compounds and had narrowed the field to two that seem the most promising. Laboratory tests have shown that these two poisons are lethal to both *ammocoetes* and adult lampreys and do not injure game fish. They are not harmful to human life or cattle. Their widespread use, however, will have to await the results of tests under actual conditions and will depend on their cost of manufacture.

One of the most interesting developments to come from laboratory studies was the discovery made by Dr. H. Kleerekoper, Professor



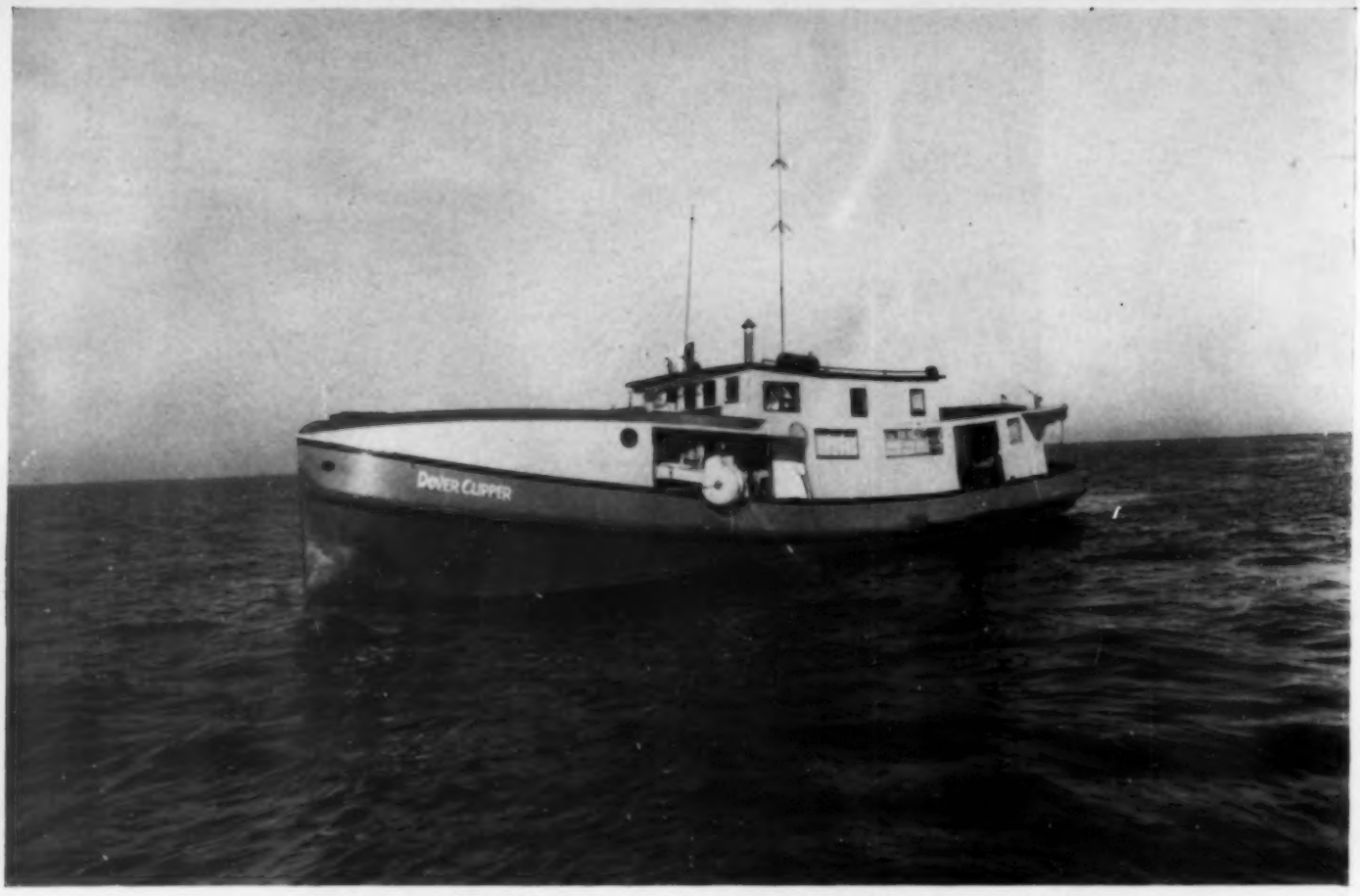
Close-up of racks in barrier shown opposite page.

of Zoology at McMaster University, Hamilton, Ontario. During research being carried out for the Fisheries Research Board of Canada into the effects of ultra-sonic sound on lampreys, Dr. Kleerekoper found that a recurring electrical field exists around the lamprey's head. In one of his experiments he rigged up a flash gun and camera, gave the field an amplification, and the lamprey took its own picture.

Properly described, the field is one of electric potentials, recurring rhythmically, from 200 to 300 millionths of a volt at a distance of about four-fifths of an inch from the head. These potentials occur every four-tenths of a second, and the duration of each is one twenty-thousandth of a second. They are called "spike" potentials because of the shape they make on a recording instrument, and have been measured at a distance of several inches from the head.

It is not known which organs generate the electrical field, but it is known that the field is closely synchronized with the breathing movements of the animals. The potentials could be produced by either nerve or muscle functions, or a combination of both. A number of experiments to determine this are in progress, involving the use of different drugs and surgical techniques. At present it appears that there is no resemblance between the electrical field around the head of the lampreys and the electric potentials produced by the so-called electric eels. Lampreys do not belong to the eel family.

Electrical installations are strongly fenced for the protection of human and wild life.



Gill-netter out of Wheatley, Ontario, in operation during fishing season on Lake Erie.

The value to the lampreys of this extraordinary characteristic is still a matter of speculation. It cannot be used as radar as it is of too low frequency, but Kleerekoper believes there is a possibility that the lampreys can perceive changes in their electrical field caused by the presence of fish or other objects capable of distorting it. Since lampreys have very weak sight, this may be one way in which they succeed in locating and attaching themselves to their prey. Whether the discovery will lead to the development of a device for killing lampreys remains to be seen.

Fillets of Lake Erie whitefish and lake trout are packaged in a south-western Ontario fish plant.

Despite the depleted condition of the Great Lakes fishery, scientists and government authorities are confident that the battle can finally be won. It may take ten years, or it may take twenty. No one is yet prepared to name the year of victory.

But once the lampreys have been destroyed will come the task of rebuilding the trout stocks in all of the lakes. Nature will help, of course, by giving the few trout remaining freedom to replenish themselves. The biggest lift, however, will probably come from hatchery-reared stock. Even today far-seeing biologists are talking about transporting by air hundreds of thou-

One of Canada's quality exports. A fisheries inspector at Windsor, Ontario, "samples" fish en route to a United States market.

sands of lake trout eggs from far northern Canadian waters, probably Great Slave Lake and Lake Athabasca.

Since lampreys came originally from the sea, there is always the danger that one day a reinvasion will occur. To date there is no evidence of sea-run lampreys in any of the Great Lakes — a fact determined by size measurements. Native lampreys seldom reach two feet in length, whereas the marine forms are closer to three feet.

Should the marine forms make their way into the lakes, however, the St. Lawrence Seaway may act as an effective barrier, for it should be possible to place restraining devices on some of the Seaway installations.

But one thing is sure: for the next decade, and possibly two, Great Lakes commercial fishermen, like Archie Bain, will have to work harder and harder to fill the holds of their ships. Sports fishermen, long accustomed to some of the world's greatest angling, will see their favourite fishing grounds getting fewer and fewer. For relentlessly, insidiously, the lampreys will continue their vile work until they are destroyed.

Such is the challenge of the lampreys. What has been achieved by Canada and the United States in fisheries management in the past, however, is certain to be achieved in the Great Lakes. It will be a long, bitter struggle, but with an eventual victory without equal in the history of world fishery management.

Lamprey control workers of the Fisheries Research Board of Canada use dip nets and portable electric shockers to collect lamprey larvae.

The San Blas maiden selects her own bridegroom and brings him back to serve her father after the wedding. Here a young couple strip rice from stalks.

San Blas Indians of Panama

by RICHARD HARRINGTON

Photographs by the author.

STRUNG OUT for 100 miles along the Isthmus of Panama lies the Archipiélago de las Mulatas. More often called "the San Blas Islands", these coral islets numbering nearly 400 are the home of a tribe of Cuna Indians noted for their independence and their ancient folkways.

The total population of the palm-feathered islands is about 20,000, but only one-eighth of the islands are inhabited. These are crowded to the tide-mark with palm-thatched huts. Ailigandi, about midway in the chain where I was visiting, has the area of almost two city blocks. Yet it has some 200 pole-sided huts, and 1,200 residents.

These islands of sand and coral are a reserva-

tion of the Cunas, whose local government and tribal customs are guaranteed by treaty with the Republic of Panama. This came about only after the Cuna protested with a minor massacre the interference with their traditional way of life. The Panamanian Intendente, who resides at El Porvenir, closest to Colón, is little more than tolerated. The San Blas Indians consider their civilization decidedly preferable to that of the white man.

Congress Hall is the largest building on each island, and here the island chief and his elders gather to discuss affairs such as setting a new tarpon net, or holding a *chicha* feast. Any problem gets thorough discussion by the island's orators, and the final vote must be unanimous to become law. When some factor threatens the whole reservation, such as Panama's suggestion some time ago that it change into a State of the Republic, the local chiefs go into conference. The chief of all the San Blas Islands, elected by popular vote, calls together the representatives and councillors to a central island for discussion.

No one works very hard on the islands, although everyone is busy and the pace is brisker than elsewhere in the Caribbean. The men return from the mainland farms about midday, and sometime in the afternoon the family gathers for its one meal of the day. This usually consists of plantains roasted in the open fire and fish stewed with coconut meat and juice, followed by cocoa.

The little farms carved out of the jungle on the mainland are difficult to distinguish from the forest itself. Here the San Blas Indians grow corn, rice, sugar-cane and coconuts. Each has his own plot, and every coconut tree its individual owner. Malarial mosquitoes infest the mainland, so that the Indians prefer to live a mile off shore on the islands, which are swept by the winds of the Caribbean.

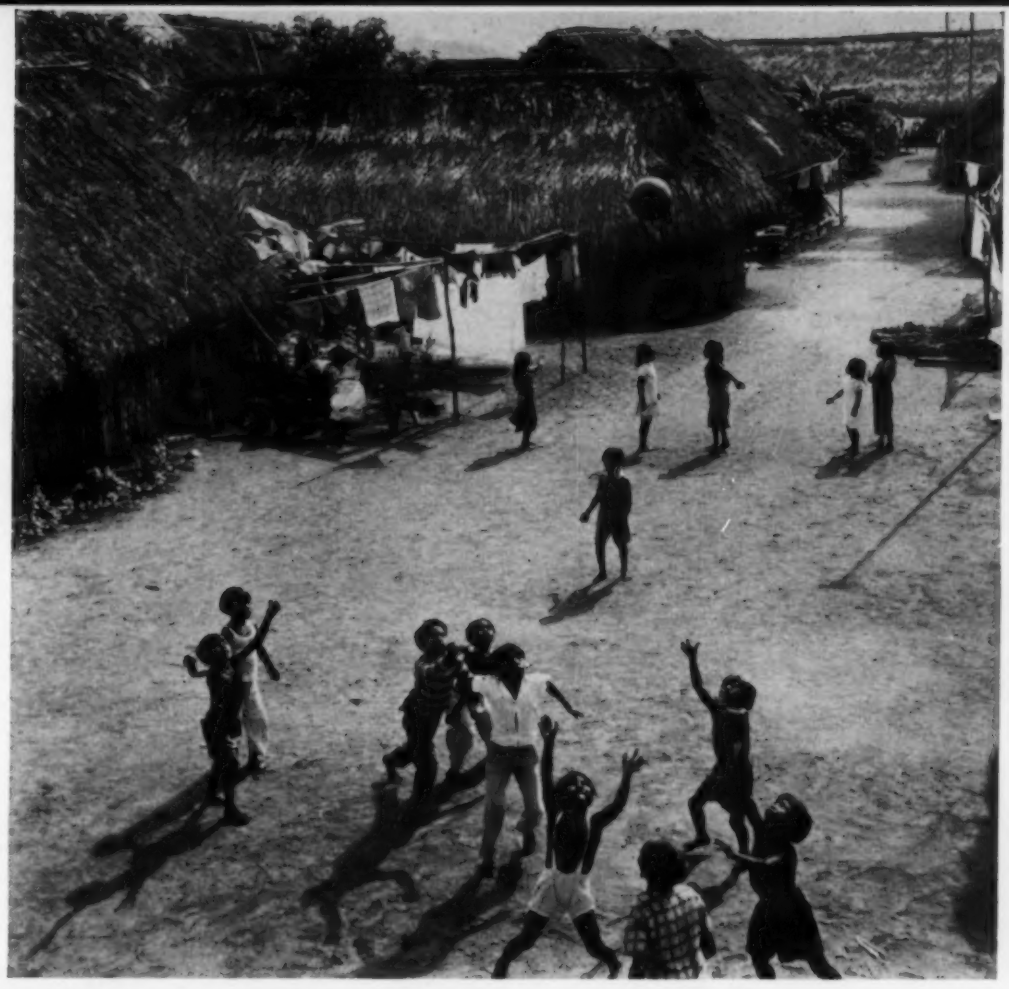
The island of Ailigandi is crowded to the tide-mark with huts. Cayucas *are drawn up on the beach in the foreground.*

Top left:—
Besides its many thatched huts, Ailigandi has modern stores (upper centre) and a cement-block mission (lower right).

Bottom left:—
Corn is stored in a rack inside the pole-sided house, but rats still get their share.

Right:—
School boys of San Blas like playing with a basket-ball, the girls with a skipping-rope. Villages are kept remarkably clean.

Below:—
Dried corn is shucked into a cayuca on the shore. The basket on the left was also made by Cuna Indians.



Transition shows clearly in this photograph of a young San Blas mother, not wearing nose-ring or head-kerchief and with hair uncut. The baby wears a factory-made dress.

The girls and women of San Blas wear appliquéd blouses, called molas, necklaces, and rings in their noses. Small boys wear nothing.

San Blas girls learn the secrets of trade early in life. Women are the business managers of the islands. The blonde girl on the left is an albino.

At any hour of the day that strip of water appears alive with dug-out canoes. Since there is no fresh water on the islands, the villagers are forever arriving and departing from the mainland, carrying empty calabashes to be filled with fresh water, or laundry for the daily wash. These Indians are remarkably cleanly in habit—they even sweep the sand between their huts with brooms. They bathe several times a day with their clothes on.

Along the banks of the mainland rivers are little thatched huts, erected over the graves of the dead. Loud wailing accompanies a funeral; but once the burial is over, it is the custom to forget deliberately, and not refer to the dead again.

Death and sickness attack the islanders like everyone else, but they believe it to be the work of a malignant spirit which has somehow been offended. There are several ways of treating illness: by baths of sea water infused with medicinal bark, by burning pepper, by chanting, and by carving figures out of balsa wood. The Indians distrust the white man's doctoring, and resent Panama's insistence on vaccination. However, little by little, they are coming to rely on the medical benefits of schools and missions.

Public schools are staffed largely by Roman Catholics, for Catholicism is the faith of the republic, generally speaking, though not necessarily of the San Blas Indians. Several mission schools hold a precarious position in the islands, where the youngsters, boys especially, are taught many forms of handicraft. The pupils speak Cuna at home and Spanish at school.

Some of the men who have worked as sailors or with United States Army construction crews during the Second World War speak good English. It is considered quite suitable for a youth to go away to school if the opportunity arises or to take a job as a sailor. He is expected to return to the islands leaving foolish "progressive" ideas behind him. The women rarely leave their island homes, and only in the company of a male relative.

The women are the business managers, just the same. They direct the collection and sale of coconuts, which are actually the currency of the islands. San Blas coconuts have particularly thick meat, good oil, and part readily from their shells, so there is an unfailing market for them.

When the monthly "coconut boat" calls around, the women select trade goods and supplies. When the excursion schooner brings tourists, it is the women who have necklaces of seeds and shells, balsa carvings and appliquéd blouses for sales. These *molas*, which require so many tedious stitches to create, are their form of artistic expression. No man attempts to influence the matron of San Blas in her merchandising, or dreams of selling anything without her approval.

Her main purchases are cloth, soap, cocoa, beads and salt. Nature provides most of the necessities of life. Gold has always charmed the San Blas Indians, who think of themselves as "the golden people", not only for their love of the mineral but for their superior culture.

Since there are no banks on the islands and there is little use for money, the women wear gold and silver coins in heavy necklaces. From babyhood, a girl wears a gold ring in her nose, and on dress-up occasions, she dons three-inch discs of gold (sometimes alloyed) to hang from her ears. These ear-rings are heirlooms, and highly treasured in a family.

Small beads on long threads are wound tightly around wrists and ankles to make them slim, and are only removed when the string breaks and must be repaired. Married women may wear rings on every finger.

This conspicuous display of wealth is con-

Two policemen of the San Blas Islands. They carry wands of office, each carved with a personal totem, but no other weapons.

fined to the women. The men wear ordinary shirts and pants, often home-made by themselves on hand-operated sewing-machines. A felt hat is their one item of sartorial elegance.

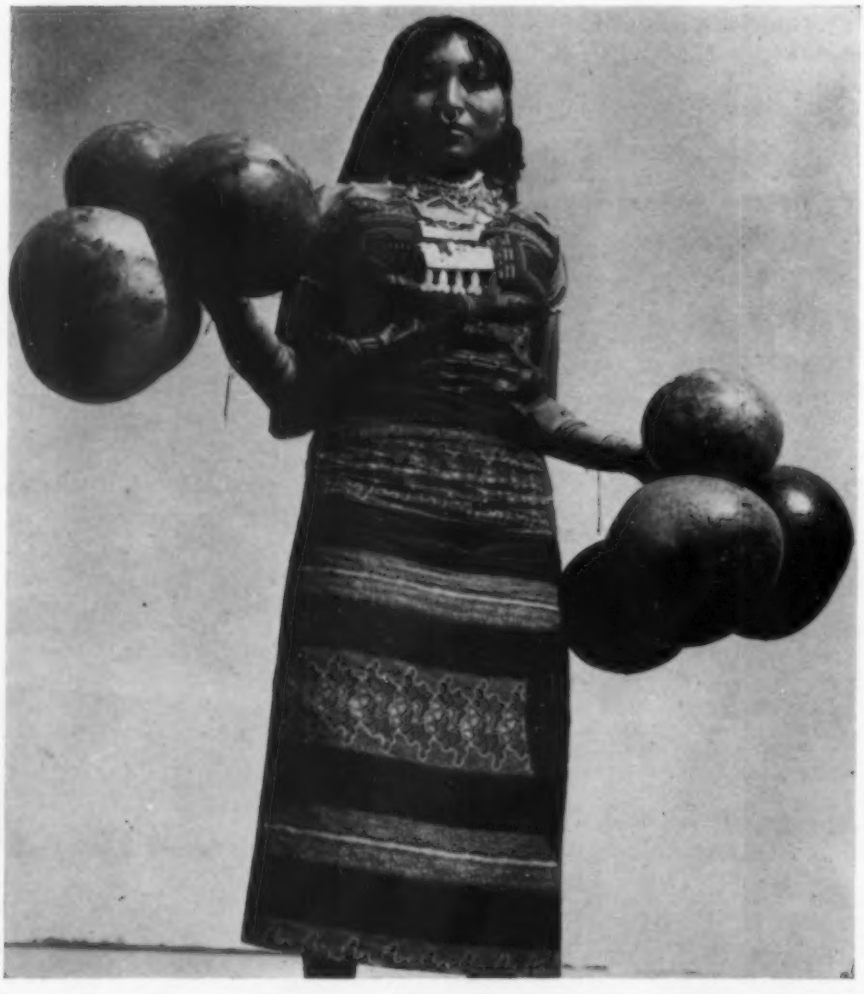
Perhaps because of their intense zeal for keeping their racial stock pure, there is a high rate —about one per cent—of albinism amongst the brown-skinned dark-eyed islanders. These albinos, extremely fair in skin and hair, suffer from weak eyes and are more comfortable abroad after sunset. They are called "the children of the moon", since the islanders believe them to be born under a special phase of the moon. During an eclipse of the moon, the albinos are encouraged to stay outside the huts as protection for the rest of the villagers.

The albinos are just as intelligent as the others, yet not as welcome in matrimony. Many of them do marry, and their children are not necessarily albinos. In the San Blas Islands, the maiden selects her bridegroom herself, and after the marriage ceremony takes him to her father's house to work for him.

This fanatic interest in keeping their blood lines pure influenced the Islanders to pass a law that outsiders might not remain on the islands after sunset. Death might be the penalty. This is still the ruling, but its application is no longer so rigid. Visitors are welcomed by day, but they must return to the mainland at night, unless approved by the council and sponsored by some outstanding individual.

At top:—
Only rarely will the San Blas Indians smile for the camera. This Cuna Indian girl is proud of her heirlooms of gold and her slender wrists and ankles.

Right:—
Sugar-cane is good straight from the field, even if it is drippy. The small boy's expression is eloquent of his enjoyment.

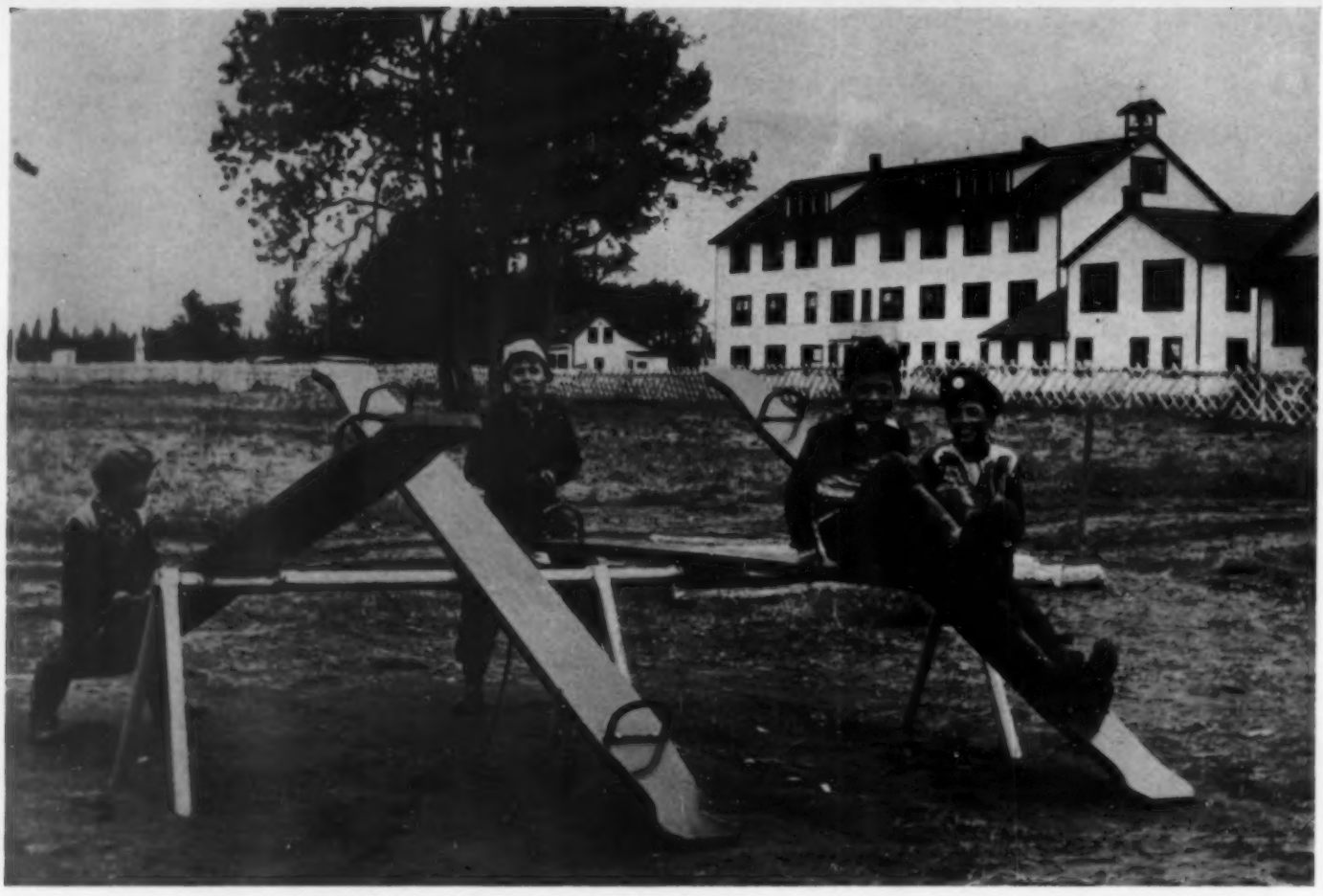


Top:—
The mainland rivers provide fresh water for the calabashes and water for bathing and laundry. Girls handle cayucas expertly.

Left:—
A young woman of San Blas in customary costume of wrap-around skirt, appliquéd mola, heavy necklaces and large ear-rings. She holds empty calabashes.

Right:—
Coconuts are the currency of San Blas and are highly prized for the thickness of their meat and the ease with which they part from the shell. This lad is prying open the outer husks.

Below:—
The whole family helps press the juice out of the sugar-cane into a tin tub. An albino son puts his weight on the end of the beam, supporting himself with a stick.



Indian children at Moose Factory. Bishop Horden residential school is shown in the background.

Moosonee and Moose Factory

by FRED BRUEMMER

Photographs by the author

THE YEAR 1931 was the turning point in the history of Moosonee. In that year the completion of the railroad linked Moosonee and Moose Factory to the outside world after two and one-half centuries of isolation.

Moosonee is now the centre of commerce for the entire James Bay, an area bigger than the whole of France. All summer, ships of the Hudson's Bay Company and the Catholic Mission arrive, load, and leave again for far-flung posts in James Bay and Hudson Bay. The drone of aeroplanes fills the air, as they land on the Moose River or take off carrying mail and passengers to the settlements along the coasts and isolated inland posts.

About sixty white people and 400 Indians live in Moosonee. Some of the former work for the missions or the Hudson's Bay Company. Others have their own stores, or work at the weather-station or for the railroad, or engage in other transportation business.

Apart from a few old houses, Moosonee has been thoroughly modernized. The people who live there lack few of the comforts and facilities that could be found in settlements of similar size farther south. The houses have electricity and running hot and cold water, and many are surrounded by carefully tended gardens.

Most of the Indians are trappers. They leave Moosonee in the fall and stay at their traplines till spring. Their average income from the sale of furs is between $200 and $400 a year. Some work during the summer months but the majority just relax. The poverty of the Indian village, standing somewhat apart from the white settlement, is in harsh contrast with the

latter's prosperity. Most of the Indians still live in tents. Some of them have built crude little shacks that offer little more comfort or protection than the tents.

Since the railroad opened the region, a few tourists have been coming in during the summer. In the fall numbers of hunters arrive at Moosonee on a special train, *The Blue Goose*.

Myriads of migrating geese fly from their breeding grounds in the far north, southward along the shores of Hudson Bay, to congregate on the southern shore of James Bay, and fatten up preparatory to their long flight to the southern United States. Goose hunting is a big business in Moosonee. The white people rent accommodation or organize hunting parties and transportation. The Indians serve as guides. During the winter months few tourists visit Moosonee.

On an island in the middle of the Moose River, about two miles from Moosonee by boat, is Moose Factory. In 1673 the Hudson's Bay Company established a Moose Factory Trading Post. This post, no longer in existence, did not stand on the site of the present building; it was on another island. The oldest structure at Moose Factory today dates from about 1740.

The history of the settlement is most colourful; but the present community gives little hint of this. The island may be roughly divided into two parts, the modern and the historic. The latter is occupied by the Hudson's Bay Company and the Indian village. The company has a store on the mainland and its warehouses are also in Moosonee, but the main store stands on the historical site in Moose Factory. In this district the houses are old. The small forge close to the company's store is one of the oldest buildings in Ontario.

The Indian village is bigger than the one on the mainland and there are few tents. Most of the Indians on the island have built permanent homes.

The Catholic Mission is located on the mainland; but it has a church on the island. The Anglican Mission has only a small church on the mainland, whereas the main mission buildings are in Moose Factory. Also on the island is the post of the R.C.M.P., manned by two Mounties. Theirs is a unique position, since their territory includes parts of three distinct areas—Quebec on the east shore of James Bay; Ontario at Moose Factory and Moosonee and on the west coast of the bay; and the Northwest Territories, to which the islands in the

Building and dogs bespeak the north land. Huskies in front of Moosonee's only grill. There is also one hotel.

C.G.J. map

bay belong. This is considered by headquarters as the southernmost of its northern posts. The men police the entire James Bay area, in winter by snowmobile, in summer by boat.

On the mainland are two schools, the separate school run by the Catholic Mission, and the Government public school for Indian and white children alike. In Moose Factory there is a big residential school, where young Indians are taught along the lines of the normal Ontario curriculum. The Indians are usually more than anxious to have their children attend school. They realize that an education will be good for them, and that the school is an ideal place to leave them, when they go away for the winter to their traplines.

In direct contrast to the Indians' sooty shacks straggling along the river banks is the large white hospital for Indians. It is an immense building, even by southern standards. Built about five years ago at a cost of at least $2,500,000, it is the largest Canadian hospital in an isolated area. It is built in the form of a Lorraine cross.

To shelter such a great number of people on the island, where no houses were available, was a big problem. One by one the houses were

The old neglected graveyard at Moose Factory. In background is the store of the Hudson's Bay Company.

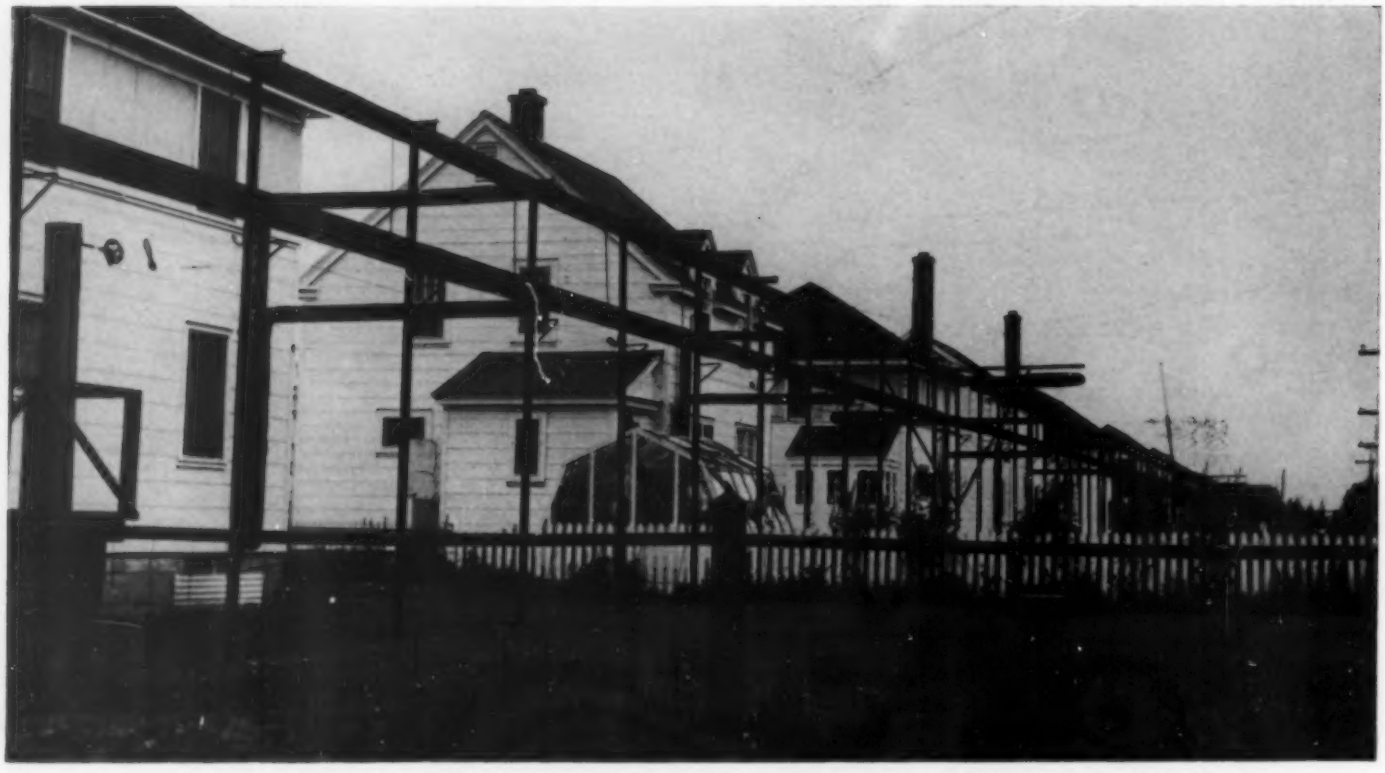
The barge at Moosonee which transports much of the equipment and supplies across Moose River to Moose Factory. At left an aeroplane speeds across the water before taking off.

built, until they formed a long row, gleaming white, with carefully tended lawns and gardens.

During summer and winter, staff members can travel to Moosonee, but in fall and spring, during freeze-up and break-up, the island is completely isolated. Despite this isolation the inhabitants enjoy most of the comforts of civilized life. They have movies and dances; in summer they play tennis; in winter badminton is popular.

Life was not so easy in the early days of Moose Factory. Mute evidence of that fact can be found on the tombstones of the old cemetery. They tell a poignant story of epidemics in which whole families were wiped out. Half of the stones are in commemoration of children who died under the age of ten. They bear such testimony of grief and heart-break as appears on the headstone with the inscription, "Edward Thomas, died 1801 at the age of one year; Mary, died 1802 at the age of four; Richard, died 1803 at the age of nine months; Jane, died 1806 at the age of two." Under Mary Thomas' name is the following annotation: "Lost among the ice with an indian family, Oct. 24, 1802," and underneath, the plea: "From sudden death good lord deliver us." These heartfelt prayers, dramatic in their brevity, leave a lasting impression of the fears and hardships besetting the early settlers.

The building of the hospital stirred up a good deal of controversy. People incessantly ask why the hospital was not built on the mainland near the railroad. As it is on an island, every-



Moose Factory has central heating, and an intricate system of pipes distributes heat to the houses. Note the hot-house behind the second house from the left.

A crane loads heavy girders onto the barge to be carried up the Moose River.

thing, including fuel, has to be transported by boats and scows. The hospital alone uses thousands of tons of coal every year, so the annual expense of transportation is rather high.

In addition to that, since great parts of the island have been cleared of vegetation along the coast, erosion has taken a tremendous toll, as much as thirty feet a year. At this rate it would be only a short while before the hospital and all the buildings tumbled into the river. To prevent such an expensive incident a shore protection has been erected at a cost of more than $50,000. A water-intake has also been constructed, costing about as much.

All this, according to the residents of the mainland, is waste of public money. The inhabitants of Moose Factory, however, claim that the mainland with its muskeg soil could not support a building of such great weight. Besides, they argue, since the hospital was for the Indians, and Moose Factory has assuredly been a centre of Indian affairs for the past three centuries, this was the natural place to build it.

The majority of the Indians from Moose Factory also go trapping during the winter. The building of the hospital and the other projects that were subsequently necessary provided many with around-the-year jobs. Apart from that, there is no industry in Moosonee or Moose Factory. An attempt, some twenty years ago, to develop the lignite beds about sixty miles south of Moosonee was abandoned. Transportation problems hinder the development of a lumber industry.

In recent years there has been a great deal of talk about vast amounts of oil somewhere underground in the James Bay area, but so far none has been struck. A boom is but a hope of the more optimistic inhabitants.

The restocking of beaver in regions that have been depleted by too much trapping and the creation of large beaver reserves, has at least ensured that trapping, the chief occupation of the Indians of this region, will not dwindle away.

Despite the lack of industry, there is a slow and steady progress. The living conditions of the entire population have improved during recent years. Almost everyone is confident now about the futures of the ancient settlements of Moosonee and Moose Factory.

The modern hospital for Indians at Moose Factory, built in the form of a Lorraine cross. Most of the patients suffer from tuberculosis.

A mosque of the fifteenth century in Fès, richly decorated with mosaics inlaid with bits of ceramic and lapis lazuli and other semi-precious stones. It faces in the direction of Mecca. The doorway opens on a large square court surrounded with porticos where the faithful perform their ablutions before going into the house of prayer and meditation. No infidel may enter.

Moroccan Visit

by C. P. M. ROBERTSON-FORTAY

Photographs by the author

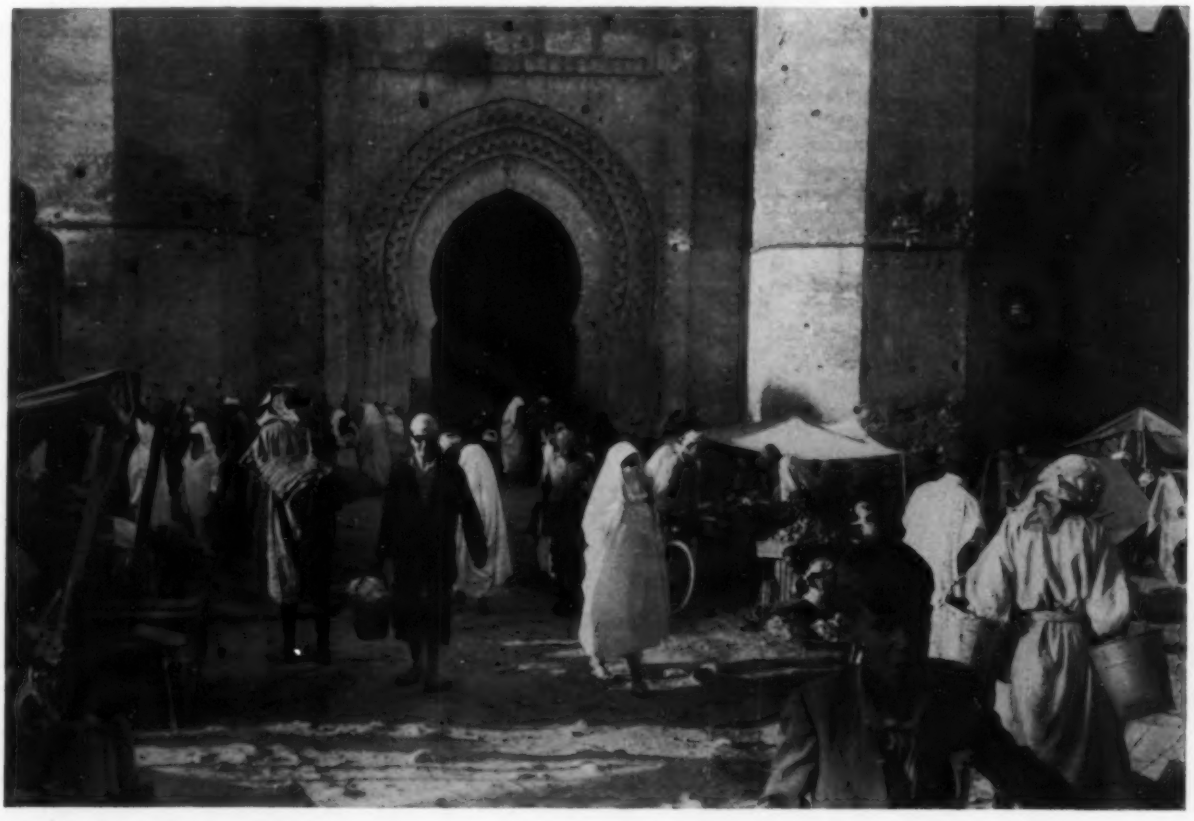
UNTIL the First World War, Morocco was practically unknown, except for the coastal towns under French influence. It has retained much of its ancient character — mystic and religious. It is a country of shepherds, sheep and goats, acrobats, snake-charmers and beggars, microtonal music, dancing and sorcery, poverty and oriental wealth. It is possessed of infinite variety and charm, peopled by a race who know the meaning of personal dignity and traditional hospitality. In spite of its aridity and barren places, flies and lack of hygiene, great heat and smells, Morocco has something which other countries lack — something indefinable represented in the changelessness of the Sahara and the complete disregard for time and human strife.

Morocco, now independent, was formerly divided into three zones — French Morocco, Spanish Morocco, and an international zone including Tangier and surrounding territory. Its reddish fertile plains and green pastures lie hard by arid brown steppes crowned by snow-covered summits and partly encircled by burnt deserts. The High Atlas Range, which contains the tallest peaks, may be regarded as the backbone of Morocco, for it divides the north from the south physiographically and climatically.

The Berber and Arab inhabitants of French Morocco are two distinct races, but today they mingle, especially in the towns. There are a number of Jews; there are also Negroes of Soudanese origin. The Europeans

Marrakech, founded in 1062, was once one of the greatest cities of Islam. The Saadians, who conquered Tombouctou (Timbuktu) in the late sixteenth century, made it their chief capital. Two of the Saadian tombs may be seen in the foreground. The tracery and mosaics on the arch are of very fine workmanship and are reminiscent of the Orient.

A market scene in the kasbah of old Fès. The vendor to the right of centre is selling yams, which grow well in the sandy arid soils of the Moroccan plateau. The markets offer little variety, their usual wares being olive oil, goat's milk, cheese made from sheep's milk, a coarse type of rice, drinking water, candles, cloth for djellabas, *and an array of patent medicines.*



The Arabs often use tents as shops. The third tent up this street outside the walls of old Fès was a barber shop; the fourth housed a physician with his blood-sucking pipes and multi-coloured pills; and in another a tailor was cutting his cloth.

A familiar scene in southern Morocco—dromedary and donkeys wait for water beside a well in the desert. This one is equipped with a rope and pulley, but many others lack these refinements. Motorists find it advisable to carry a good length of stout rope in order to draw water for their vehicles. The water would be completely unsafe to drink for all but the indigenous population.

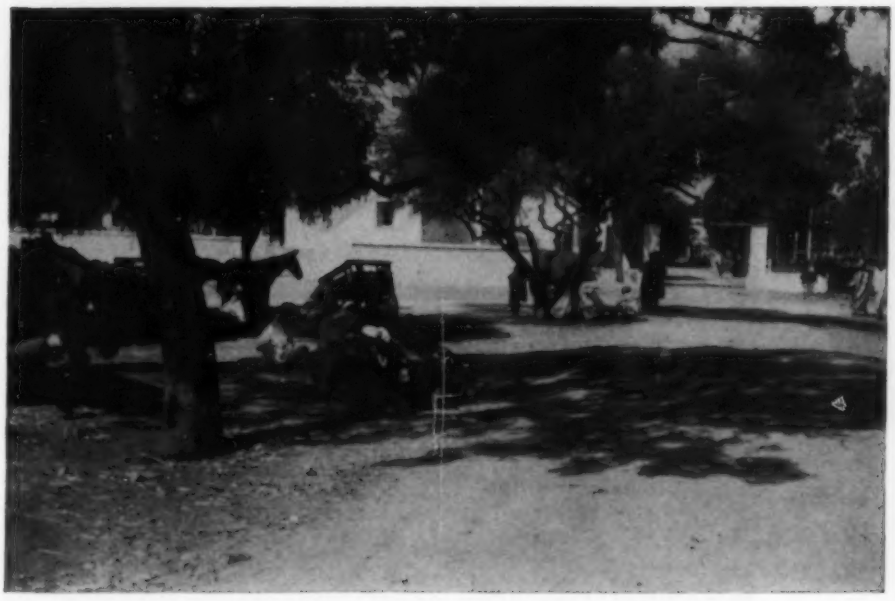
are mainly of French stock. Amongst the Berbers and Arabs, Arabic is the chief language, but those in contact with the French also speak French. The hill tribes have preserved their ancient dialects.

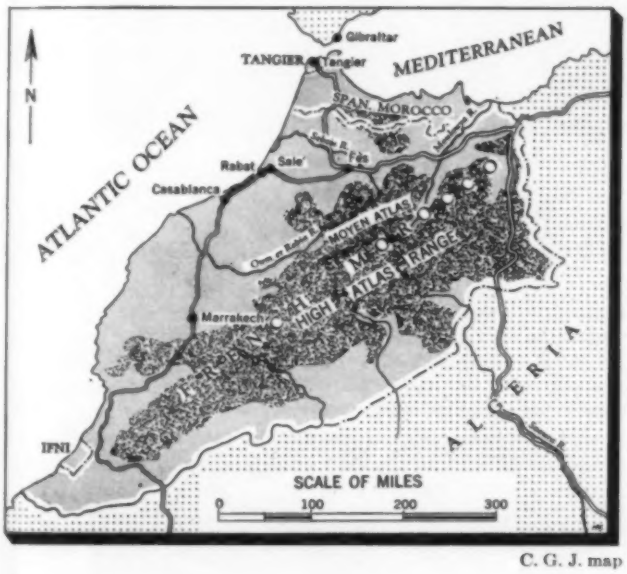
In the communities there are several distinct racial sections. The Moslem town, called the *medina*, is usually an intricate network of narrow winding streets, overhung on either side by greyish white houses. Attached to some *medinas* is a *mellah* or quarter for Jews. Nearly every major town has a completely separate European section which is mainly French Colonial in architecture, with French inhabitants. Merchants and artisans gather, home and shop in one, in streets so narrow that the sun rarely penetrates their shadows. Here the many comings and goings are accompanied by blaring music with strange but fascinating microtonic intervals.

About four-fifths of the indigenous population reside in the country, working the land or leading a nomadic existence. The sedentary agriculturist lives in a *nouala*, a conical structure of reeds or branches. He may make a daily visit to his nearby fields and go once a week to market to sell or barter his produce, but his needs are simple and he is content with few of this world's goods. The nomad moves continuously with his flocks.

Lower Left:—
Old Fès, enclosed in its ancient walls, is more oriental than Damascus, Jerusalem or Bagdad. Only the modern hydro-pole is a reminder in this mediaeval scene that this is the twentieth century. Its 150,000 people are indoors, sheltering from the great heat which seems to be intensified by the glare reflected from the white stucco dwellings; it is a city of the dead until evening when humanity overcrowds its narrow twisting streets. Part of the old wall has been rebuilt; the castellations were added during the Spanish occupation in the seventeenth century. View of the south-west walls.

Man and beast shelter from the great heat of Morocco. The Arabs normally carry grain unhusked in satchels. This helps to preserve it in the heat. When they wish to prepare a meal, they husk the grain and grind it with a small mortar and pestle. The group in the foreground is sorting and husking grain which will be cooked for the evening meal. The Arab eats little during the day, but drinks very sweet mint tea and black coffee at frequent intervals.





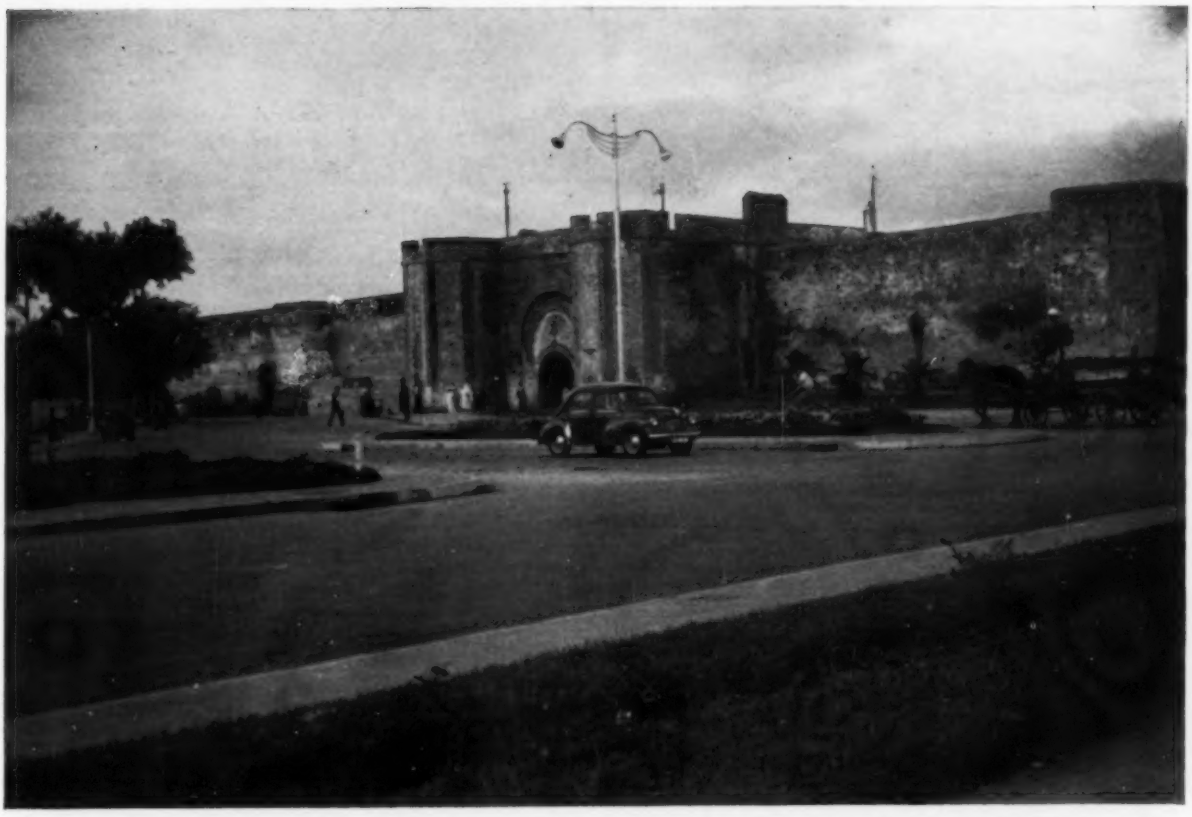
C. G. J. map

Left:—
Map of Morocco, showing the French, Spanish and international zones. These were joined to form an independent sultanate in 1956.

Below:—
Souk village in the valley of the Sebou River, with huts of bamboo and mud shaded by olive trees. Such villages are not common in North Africa and have about them a flavour of Central Africa. The hills in the background are those of the Moyen Atlas which has an east-west orientation.

Fès, founded in A.D. 808 by Idris II, has always been Morocco's spiritual and intellectual centre. It is the home of the Karouine Mosque and university, where students and scholars study traditional subjects such as religious thought, science, mathematics, dialectic and law to become the nation's leading professional men. The city has more than one hundred mosques to which believers flock to offer alms and receive blessing by touching sacred objects.

In individuality and character Moroccan gardens surpass most of the famous gardens in European capitals. The vegetation of Fès is tropical and in its Bou Jeloud Gardens, shown here, the cypresses, pomegranates and orange trees seem to grow larger with more brilliant colouring than elsewhere. The scarlet hibiscus enlivens the luxuriant floral display and mingles harmoniously with the colourful crowds bedecked in flowing djellabas, *turbans and veils, skull caps of gaudy pattern, and the crimson fez.*



The seventeenth century walls of Rabat, capital of Morocco. When Andalusian Moors, expelled from Spain during the reign of Philip III, settled beside the ancient kasbah, a new town was built, surrounded by the wall which today encloses the medina. *Rabat is a spacious city with tree-lined boulevards, fine residences and good hotels. Across the river, facing it, is the city of Salé.*

The palace of the Sultan of Morocco is situated on a vast open plain called mechouar *outside the walls of the old city of Rabat. Built in the Victorian era, it is not in keeping with the oriental splendour found in the kasbahs and* medinas *of other ancient North African towns. Its one redeeming feature is the garden within its walls, reputed to be one of the finest in the world.*

No Arab market square is complete without the snake-charmer, his box of snakes and his awwada *or flute (right foreground). The flute, often used for magical divination, is played by blowing across the open end. This particular form of wind instrument, which is little more than a tube with finger-holes and no mouthpiece, is found in various parts of the world, widely separated geographically. It is a survival of one of the most primitive instruments devised by man, yet is extremely difficult to play. The scene is the market place at Marrakech.*

The city of Marrakech, on the north slope of the High Atlas Range, may be described as an outpost of European influence; in the towns beyond it there is little evidence of foreign intrusion. Observe the differences in headgear of those in the city's market square: French, Arab, Soudanese and Jew, each wears the style characteristic of his race. The man wearing the stiff fez (behind the bicycle, with back to camera) is the water-carrier in his traditional garb.

The Moors play an instrument called a rai'tah *for wedding and circumcision processions. It is a harsh oboe played by cross-fingering and over-blowing, and the performers never seem to pause for breath. The professional player has two small holes pierced through his neck behind the ear. Those who survive this operation in childhood are assured of a good livelihood by their playing. At marriages the* rai'tah *players are accompanied by two drummers. This is a wedding procession.*

The kasbah of Fès is a labyrinth of narrow twisting lanes, shops and houses, schools and mosques, and crofters' industries. Here Arabs, squatting on their doorsteps, engage in their particular trades. The Arab on the left is making saddles for camels. Fès is one of the most amazing cities of the ancient Mohammedan world, for it has retained its mediaeval character and appearance. The medina, *with its exquisitely inlaid mosques and brightly coloured oriental carpets, has many reminders of the twelfth and thirteenth centuries.*

The Harmon International Trophy, awarded to Fred Stevenson for his outstanding flying record in northern Canada in 1927. No other Canadian has received the award.

Stevenson Field
—Winnipeg's Memorial Airport

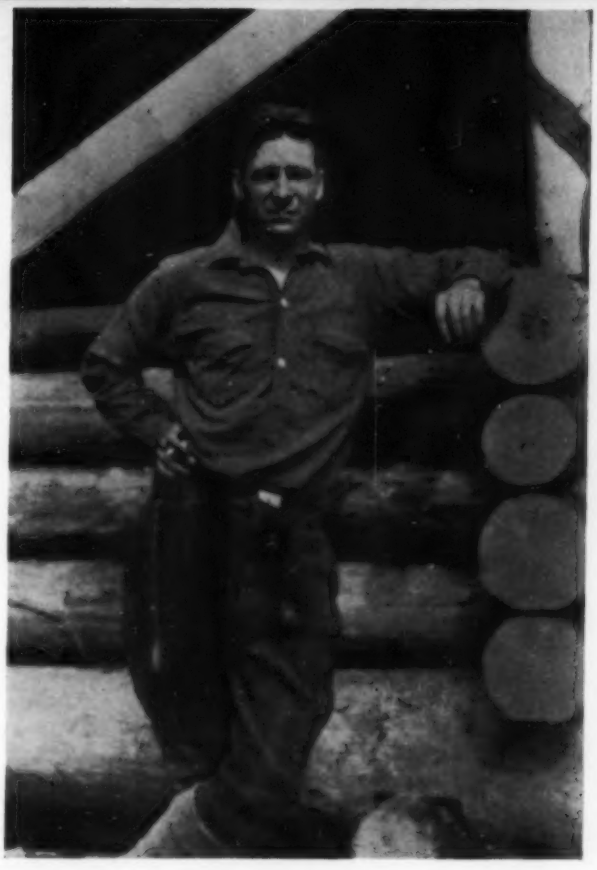
by FRANK H. ELLIS

WINNIPEG'S internationally known air terminus is one of the busiest in the world. From the few aeroplanes using it when it was officially opened on 15 October 1937, the volume of air traffic has increased to tremendous proportions. Arrivals and departures of all types of aircraft now average three a minute every day. The field ranks as Canada's fourth in importance.

Originally named Stevenson Aerodrome, it has since become better known as Stevenson Field. Its name stems from that of the late Captain Fred J. Stevenson, one of Canada's air-fighters in the First World War, who afterward added to his fame by his exploits in commercial aviation in the 1920s.

Fred Stevenson was born at Parry Sound, Ontario, on 2 December 1896 of Irish parents. Most of his home and school life were spent in Winnipeg, his family having moved there when he was a small child. When the First World War broke out, he left his studies at Wesley College to enlist and go overseas with the 196th University Battalion. Early in 1917 he transferred to the Royal Flying Corps. A natural-born pilot, he was quick to learn, and by the end of the year was back in the fray, flying a fighter aircraft. Just before the war concluded he was attached to a squadron flying

The face of the bronze Medal of Honour awarded to Stevenson with the Harmon International Trophy. It was presented to his parents after his death.



Fred Stevenson at Sioux Lookout, Ontario, during the heyday of his flying career with Western Canada Airways.

two-gun *Dolphins*, single-seater aircraft of high speed for the times but of which little was heard because the war ended shortly after they had been placed in service.

By the end of the war he had shot down eighteen enemy aircraft and three observation balloons, and had risen to the rank of captain. His share of honours included the Distinguished Flying Cross and the French *Croix de Guerre*.

For a few months following the war he was a Royal Air Force ferry-pilot between London and Paris, flying diplomats and officials back and forth. When the call went out for pilots to go to Russia to train White Russians as fliers, he was one of the first to volunteer. That venture was not very successful, because the Bolshevist Army soon overran the area in the Crimea where the flying was taking place. For his work there, he received the Russian decoration, the Order of St. Stanislas.

He then returned to Canada, and in 1920 joined the staff of Winnipeg's Canadian Aircraft Company and flew one of their three-passenger *Avro* aircraft. The work consisted of transporting passengers and stunt-flying at various centres. It was then that I became acquainted with Steve, and together we ranged far and wide over Manitoba and Saskatchewan, wherever the company sent us. His quiet unassuming manner endeared him to everyone.

The twenty-fifth of August 1920 was a bad day for him. While we were flying at Fort Francis, Ontario, we were involved in a serious crash which destroyed the *Avro* and put him in hospital for several months with a broken jaw, dislocated hip and fractured ankle. My own injuries were minor.

In 1924, fully recovered except for a limp, he entered the employ of the Ontario Provincial Air Service, and for two years flew on summer patrols over the vast timbered areas of Northern Ontario. When "Doc" Oaks founded Western Canada Airways with the financial backing of Mr. James A. Richardson, Steve resigned from aerial fire-spotting to become a pilot with the newly formed company. I did not have much contact with him from then on, but it was during the following two years that his star of flying fame rose to its greatest ascendancy.

Of the many routine flights undertaken in 1927, there were two which were to bring him high recognition. From the Department of

The reverse side of the medallion shown on the opposite page. It will be displayed in the airport's new administration building.

Photograph by F. B. Ferguson

Railways and Canals at Ottawa came a request to the company's headquarters at Winnipeg to fly material and a crew of fourteen men from Cache Lake at Stop 432 on the Hudson Bay Railway to Fort Churchill on Hudson Bay. Two *Fokker Universal* ski-equipped aircraft were at once allotted to the work by Oaks, with "Rod" Ross as field superintendent, Fred Stevenson and Bernt Balchen[1] as pilots, and Al Cheesman[2] as engineer. Thus, the first northern air-lift got under way on 25 March 1927. The weather was bitterly cold, with heavy ground fogs much of the time, making the undertaking most hazardous and decidedly unpleasant for the airmen in their open cockpits. Only by most strenuous effort did they complete the assignment before winter break-up on 20 April.

On one return flight from Fort Churchill the *Fokker's* engine heated up through loss of oil from a broken pipe, and Steve was obliged to make a forced landing in the wilderness, seventy-five miles short of his destination at Cache Lake. After an uncomfortable night seated in the machine with wolves giving tongue all around him, he set out to walk the rest of the distance. On the way he came across snowshoe tracks which led him to an Indian trapper's cabin. As the leg injured in the Fort Francis mishap troubled him, he persuaded the Indian to take him out by dog-sleigh. The huskies were in such poor condition and travel was so difficult that Steve was obliged to snowshoe much of the way; however, under the Indian's guidance the trek was made directly to Stop 432.

When Steve tramped into camp, he could not believe his eyes; for there stood his aeroplane. When he had not arrived on schedule, Balchen and Cheesman had taken off in the other *Fokker* to search for him. Finding the machine and a note he had left, they had patched up the broken pipe and flown it back to base.

The value of the flying accomplished is better understood by a quotation from the report on the undertaking issued by the Canadian Government. In part, it read: "Notwithstanding the distance from any prepared base, and the severe winter conditions, the operation was an unqualified success, the men and equipment were landed at Fort Churchill. The decision during 1927 as to the selection of Fort Churchill as the ocean terminus of the Hudson Bay Railway was made possible by these flights. There has been no more brilliant operation in the history of commercial aviation."

In August 1927 Western Canada Airways were asked to fly machinery and personnel to the Sherritt-Gordon mine, then being

(1) Bernt Balchen later earned world-wide acclaim as Commander Richard Byrd's pilot on the trans-Atlantic flight in 1927, and in connection with additional flights in the Antarctic. He has since become an important figure in international aviation.

(2) Al Cheesman received wide recognition as one of Sir Hubert Wilkins' pilots in the 1937 Arctic search for six missing Russian airmen.

The original flying personnel of the Ontario Provincial Air Service, one of Canada's finest groups of "bush" pilots. Fred Stevenson is seated in the front row, second from the left.

Left to right:—"Rod" Ross, Bernt Balchen, Al Cheesman and Fred Stevenson. The photograph was taken immediately after their epic flight between Cache Lake and Fort Churchill in 1927.

established in the muskeg area of Northern Manitoba. The head of the mining firm, R. J. Jowsey, offered the contract to "Doc" Oaks, who immediately accepted the challenge and assigned Stevenson to fly the tons of machinery and other material. Many shuttle flights were made by the airman from The Pas to the remote mine site before the task was completed—the first of its kind in the north.

On 5 January 1928 the rising career of Fred Stevenson was suddenly terminated, when the *Fokker* he was flying crashed into one of the streets at The Pas shortly after taking off. The cause of the crash was never determined. It was the first fatal air accident in the north country. Canada lost a fine airman.

His flying accomplishments in 1927 had already been brought to the notice of the awards committee of *La Ligue Internationale des Aviateurs* in Paris. From the many nominated, Stevenson was selected as the winner of the Harmon International Trophy for 1927, as Canada's leading commercial pilot. Several years later an official presentation was made in Winnipeg of the bronze medallion included with the award. It was handed to the pilot's parents by His Honour Lieutenant-Governor W. J. Tupper at the Provincial Parliament Buildings. Because of the untimely death of Stevenson, the massive trophy itself never did come to Canada, but it bears the award inscription.

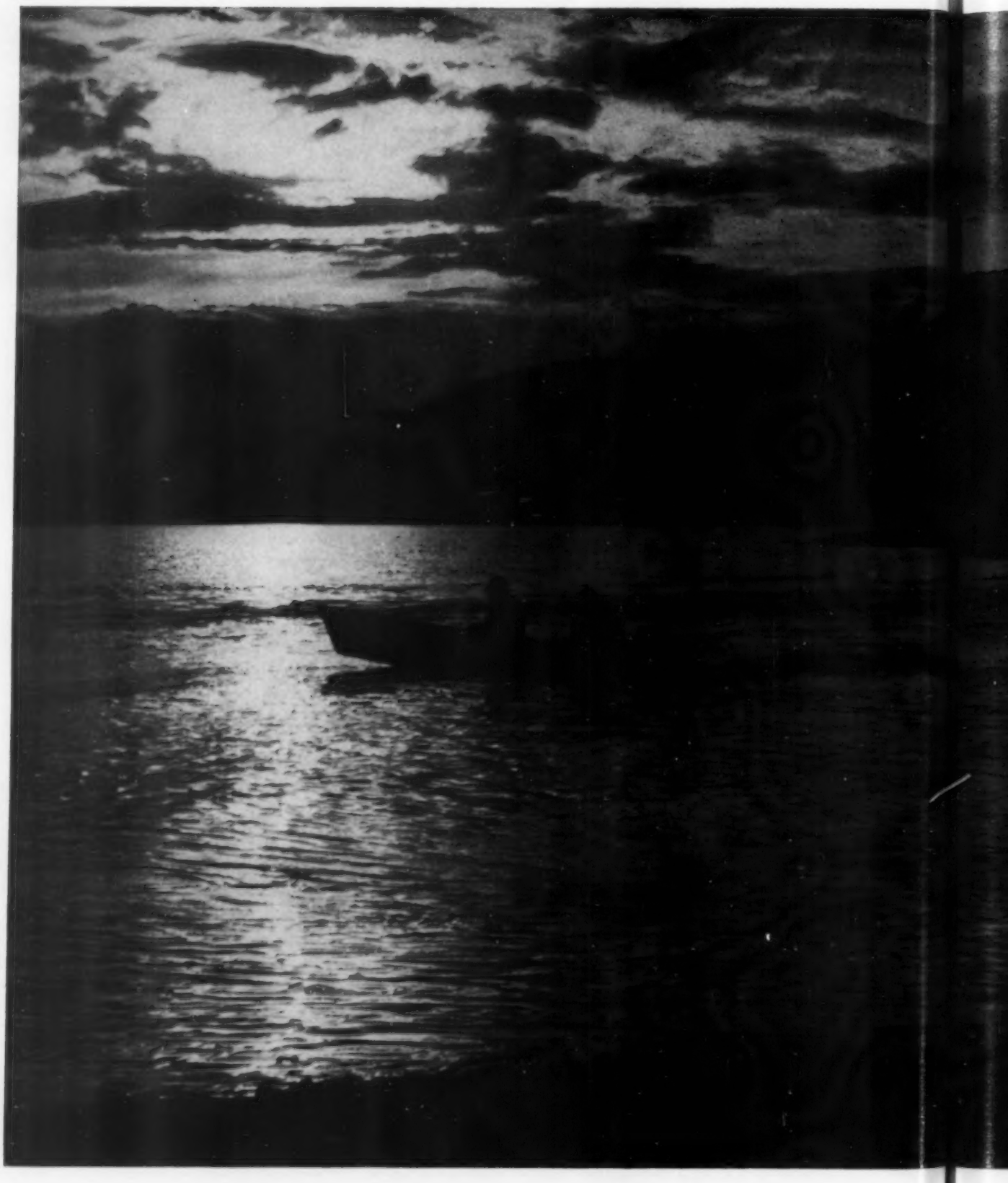
When the airport was opened officially in 1937, the marble plaque naming it Stevenson Aerodrome was unveiled by the airman's mother. Later a fire levelled the building, but the plaque was salvaged from the debris. At present it is on view in the lounge of the Winnipeg Flying Club, awaiting the day when the new terminus will be built, to be again placed in a prominent position. The surviving members of Stevenson's family, his two sisters, have placed his war decorations and Harmon Trophy medallion in the hands of the Mayor of Winnipeg for display in the new administration building.

During the past five years traffic at the airport has almost trebled. In 1950 some 57,152 aircraft landings and take-offs were registered, but in 1956 the figure was almost 175,000. A heavy volume of military operations has swelled the total. Canada's Air Navigational School is across the airfield from the civilian commercial buildings. Today about $10,000, 000 in salaries is divided annually between military and civilian employees at the airport. The establishment of the radar defence stations across the Canadian northland has also been reflected in its traffic. It is the centre for the comings and goings of the great armada of aircraft plying to and from the north.

Plans are now under way to provide ground facilities adequate for the increased commercial traffic. Already the two original 3,200-foot runways both have been extended to 6,400 feet in length and widened to 200 feet, and a new east-west runway 7,000 feet long and 200 feet wide has been added.

With such hustle and bustle and expansion, perhaps it is not surprising that the man for whom the airport was named is rarely mentioned. But there are many who remain mindful of his contribution to aviation. In Winnipeg's Brookside Cemetery a simple cross marks his resting place. The brief message on it concludes with three words, "Faithful Unto Death"—a fitting tribute to Fred Stevenson, both in days of war and peace.

Photographs by the author except where credited



Wilderness Park—Lake Superior

by ADELAIDE LEITCH

Photographs by the author

TWO DECADES before an Order-in-Council created a provincial park in Algoma, this scenic wilderness north of Sault Ste. Marie had already attracted a select little group of Canadians with an eye for the outdoors.

Hiring a box-car from the Algoma Central Railway, enterprising artists of the Group of Seven fixed it up as mobile living quarters and, in the early 1920s, headed for the artistically-neglected wilderness to paint Canadian landscapes. The railway set out the box-car at different points along the line, mainly in the Montreal River and Agawa Canyon areas. Although the critics of that day derisively dubbed the Group of Seven the "Hot mush school", their landscapes of the Lake Superior country as well as of the Georgian Bay and other parts of Canada did set a new trend in Canadian art.

Lying one hundred-odd miles north of Sault Ste. Marie, the park bulges out into Lake Superior—a 541-square-mile forest wilderness of rushing trout streams, tiny lakes, and abundant wildlife, including numerous moose. On the west, it is bounded by the headlands and crescent beaches of Lake Superior, on the east by the rails and property of the Algoma Central and Hudson Bay Railway. It stretches from the Montreal River on the south, past the Agawa to the Michipicoten River.

Created by an Order-in-Council of 13

Lake Superior Provincial Park illuminated by a summer sunset.

January 1944, the park until now has remained roadless. Visitors fished on its shoreline in lake cruisers, or glimpsed the interior from the windows of railway coaches. At the boiling chasm of the Montreal River, Number 17 Highway from the Soo abruptly ended. Today, the highway runs across the Montreal on a high, temporary bridge, and road-builders are moving through the park itself toward Michipicoten Harbour and the eventual closing of the highwayless gap between here and the paper town of Marathon. By 1958, the whole highway is expected to be complete from Sault Ste. Marie to Port Arthur, and will fulfil its role as the Northern Ontario link of the Trans-Canada Highway. Meanwhile, in the summer of 1956, in spite of the large clear signs that warned "End of the Road at the Agawa River", cars rolled over the gravelled route as far as they could go, then parked on the river bank to watch engineers at work on the Agawa bridge.

This is excellent camping country. One enthusiastic American visitor last summer called it "the finest park in Canada." No administrative policy has yet been laid down for the camp sites, but many tents have already risen on the broad strip of beach designated as a camping area. It faces the horizon of Lake Superior, but is protected from the full blast of wind by a sprinkling of islands and the blue Algoma hills curving out from each end.

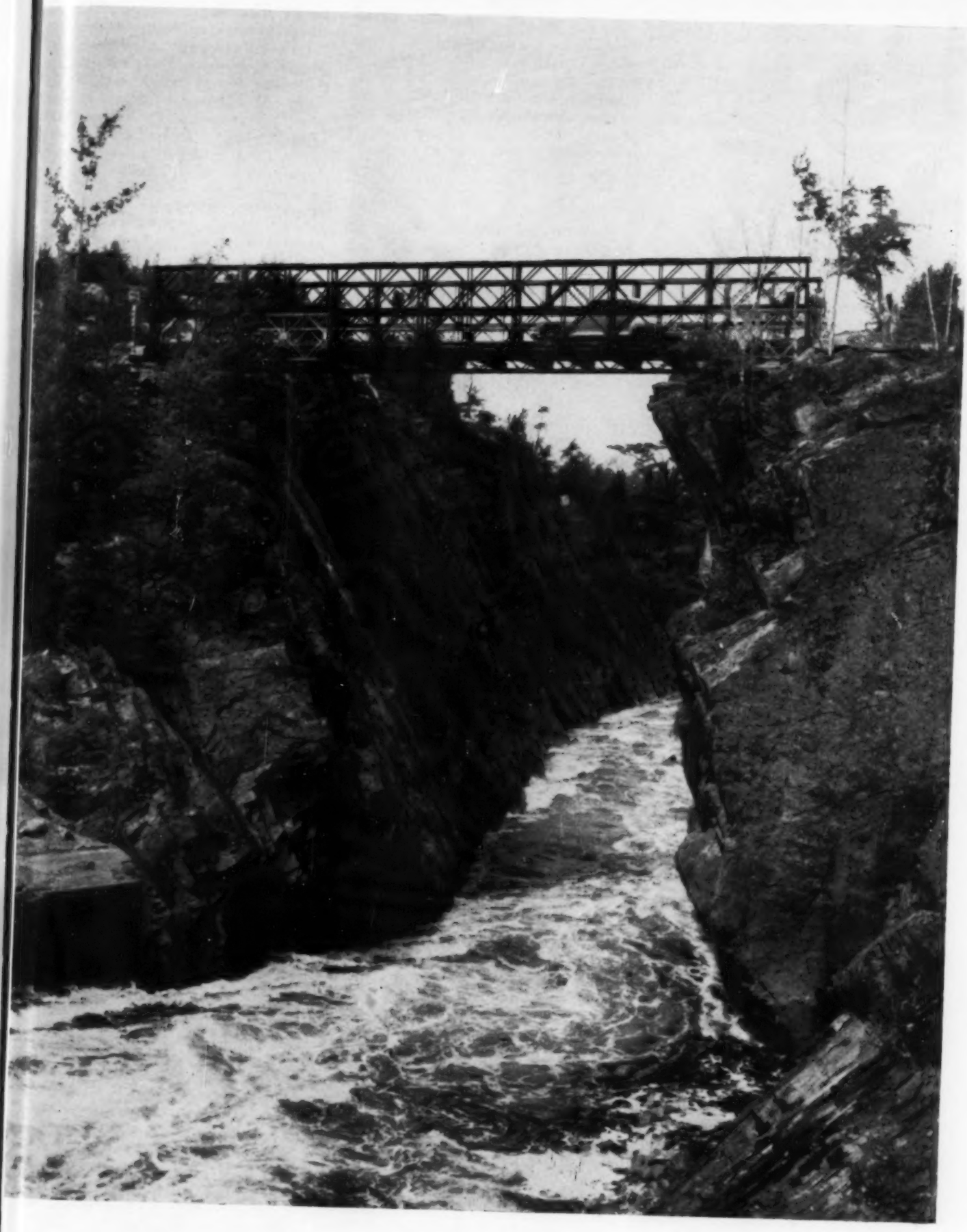
The park is fed by crystal-pure streams with picturesque names like Sand, Baldhead, Gargantua and Old Woman River. Inland, Indian names linger on some of the lakes — Myinemungshing, Kashog and Gamitagama. Hunting and trapping are still allowed, so is fishing for speckled and lake trout. The famous "flying firemen" of Sault Ste. Marie — men of the Ontario Department of Lands and Forests — patrol this whole district, with aircraft equipped with ground-hailers.

Old lumbering trails, all but obliterated, ramble into the interior in some places. Mineral wealth locked in Algoma brought the Algoma Central and Hudson Bay Railway north through the area in 1899. All construction materials and locomotives for the railway branch that connected Michipicoten Harbour with the main line were freighted in by boat. Until the branch was connected in 1911, dog teams took the mail over the old Grasset Trail to the Canadian Pacific Railway line in winter. The Agawa Canyon — a highlight for the present-day traveller who takes a "colour tour" in the fall — was a nightmare for the early engineers.

The Soo-Montreal River approach to the Lake Superior Provincial Park is paved, and strewn with fishing lodges and camp sites that have been doing business for years with local people and an increasing number of summer visitors. The highway skirts the north shore of Lake Superior around Batchawana and Pancake Bays and passes the long-ago shores of Lake Superior — now great, rolling dunes of gravel high above today's shoreline. A Department of Lands and Forests sign says they are 15,000 years of age and asks visitors not to disturb these scientific curiosities.

Meanwhile, cars drive along the North Shore Highway and penetrate as far as they can go inside Lake Superior Provincial Park, an area made famous by Canadian artists.

A high bridge and the thundering torrent of the Montreal River mark the southern boundary of Lake Superior Provincial Park. A dam and powerhouse are also in this area.



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EDITOR'S NOTE-BOOK

F. H. Wooding (*Draculas of the Great Lakes*), an experienced writer who has contributed numerous articles to the Journal, is an authority on Canadian fisheries and is well informed about lamprey control, the subject of this article. Mr. Wooding is Director of Information and Educational Services in the Department of Fisheries, Ottawa.

* * *

Richard Harrington (*San Blas Indians of Panama*) is a well-known photographer who lives in Toronto but spends much of his time travelling in quest of new camera subjects. The fine quality and sensitivity of his work have won him a large audience.

* * *

Fred Bruemmer (*Moosonee and Moose Factory*) is a freelance writer and photographer who lives in Toronto. Formerly he was on the staff of a newspaper in northern Ontario. He has contributed several short articles to the Journal.

* * *

C. P. M. Robertson-Fortay (*Moroccan Visit*) is a well-known writer with a keen interest in exploration and travel. After graduating from Oxford University, he pursued post-graduate studies in geography there and at McGill University. Following service with the Royal Navy during the Second World War, he taught geography at Trinity College School, Port Hope, Ontario.

* * *

Frank Ellis (*Stevenson Field — Winnipeg's Memorial Airport*) for many years has been writing articles and books concerning Canada's aeronautical history, a subject on which he is a recognized authority. He was a crew member on the aircraft that made the first flight into the Canadian north country — from Winnipeg to The Pas — in October 1920. His book, *Canada's Flying Heritage*, won the top award for aviation writing on this continent in 1955.

* * *

Adelaide Leitch (*Wilderness Park — Lake Superior*) is a freelance writer and photographer, who has contributed many attractive articles to the Journal. She has travelled extensively in Canada and Europe.

Canadian Association of Geographers

Seventh Annual Meeting

Wednesday, 5 June 1957, was something of a "red-letter" day for the geographers of Canada. Not only was it the day on which David Thompson, the pioneer geographer, was honoured with the issue of a special postage stamp, but it was also the day on which the Federal Geographical Branch had its origin ten years ago and the day on which the Canadian Association of Geographers began its Seventh Annual Meeting at the University of Ottawa as part of the 1957 Conference of Learned Societies.

Because of the special significance of the date, an extensive programme was arranged. There were four morning sessions at which sixteen research papers were read. The Wednesday morning session was devoted to Historical Geography and included papers on the Ross expedition of 1829-34, the use of land surveyors' reports, on the Lesser Antilles and aspects of the geography of southern Ontario. The morning concluded with the Annual Business Meeting at which it was announced that Dr. Trevor Lloyd, Chairman of the Department of Geography at Dartmouth College, New Hampshire, had been elected President for 1957-8. The Thursday morning session was held at Carleton University when papers on economic, physical and mathematical geography were read. Urban geography and geography and planning occupied Friday morning, when the topics ranged from town sites and urban land use in south-western Saskatchewan to manufacturing in downtown Toronto and a discussion of the conflict between the theoretical and practical factors in devising planning units. This session concluded with an address by Walter B. Bowker of the Federal District Commission. This served as an introduction to a five-hour afternoon field trip in the Ottawa area when some seventy participants investigated such diverse features as Rideau Falls, new housing developments, the Gloucester Fault and the old portage around Little Chaudière Rapids. In addition, two other afternoons were spent in guided excursions to the Army Survey Establishment, Public Archives, Canadian Aero Surveys Limited, Experimental Farm, Dominion Observatory and National Air Photo Library.

During two of the evenings, there were special showings of films of geographical interest arranged by Crawley Films and the National Film Board.

The presidential address was delivered on another evening when Dr. Pierre Camu of Laval University spoke on "Tolls on the St. Lawrence Seaway".

Two panel discussions were organized which proved very popular — one on "Geography in Education" and another, "Geographers in Business and Industry", in which five of the increasing number of Canadian business geographers participated. The final afternoon was devoted to talks by senior civil servants whose work is of interest to geographers — R. A. Phillips, Department of Northern Affairs and National Resources, Dr. C. C. Lingard, Dominion Bureau of Statistics, T. Blachut, National Research Council, I. Bowen, Joint Intelligence Bureau, and N. L. Nicholson, Geographical Branch.

On the evening of Saturday, 8 June, the Association held its first dinner. The book prizes, which are awarded annually to the best geography student in the graduating class of each Canadian university, were presented publicly and Dr. Marc Boyer, Deputy Minister of Mines and Technical Surveys, gave an illustrated talk on "Alberta Gas to Eastern Canada". This concluded the proceedings for which over 100 geographers registered, making this the most successful national meeting ever held by the Association so far.

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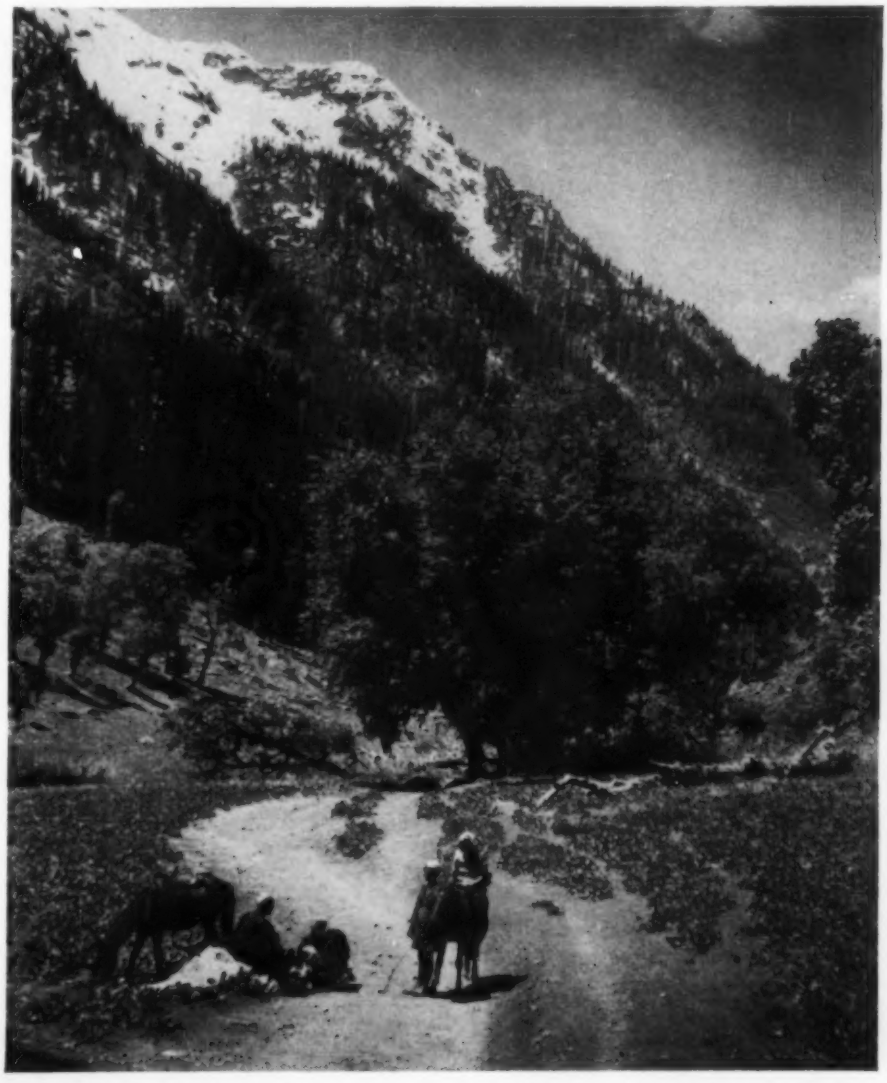

In the Liddar Valley on the way to the sacred Lake of Amarnath in the Vale of Kashmir.

Hedda Morrison

A Bird's-eye View of India

It would be impossible in these few lines to paint a picture of India that would do it justice and reveal its many unique characteristics to the stranger. Anyone fortunate enough to tour the country will weave the threads of personal experiences and observations into a rich tapestry of memory. Here we suggest a few interesting places to visit.

The principal city of the western region is Bombay, an important centre of trade and industry. Of special interest to tourists are the Hanging Gardens on the Malabar Hills, the Prince of Wales Museum and Art Gallery, the Marine Drive and the beach at Juhu. In the harbour about six miles east of the city lies the small island of Elephanta, famed for its cave temples, at least 1,000 years old, which contain huge carved figures representing Hindu deities. There are a number of other ancient cave temples in the western region, but the most outstanding are at Ajanta and Ellora. The former, consisting of twenty-nine caves hewn out of rock, are decorated with beautiful paintings and pieces of sculpture. At Ellora is the ornate Kailash Temple, carved out of a single rock. It, too, is rich in carvings and sculpture.

The gateway to the south is Madras, once centre of the Dravidian civilization, a city in which the very old and very new are often found in

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close proximity. The museum, the temples at Mylapore and Triplicane, and Marina Beach are among its chief attractions. Not far distant is the seaport of Mahabalipuram, whose monolithic temples, sculptures and carvings are among the most important architectural ruins in southern India. Of all the religious edifices of the south, perhaps the Minakshi Temple at Madurai is the most striking, with its pyramidal towers, shrines, halls, colonnades, carvings and sculpture. In October, Mysore, in the southern state of the same name, is the scene of the Dussehra Festival, a gay and colourful spectacle. Also worth pausing to see here are the Maharajah's Palace, the Jogan-modan Art Gallery and the Brindavan Gardens. Not far away are the temples at Somnathpur, Halebid and Belu, spoken of as masterpieces of Hindu art.

The populous city of Calcutta, capital of West Bengal, is India's commercial and educational centre. Its lavishly decorated Jain Temple and botanical gardens attract many visitors. At Santiniketan, about 100 miles away, the celebrated poet Tagore founded the Vishva Bharati University, an outstanding institution which is attended by students from all parts of India and abroad. North of Calcutta at Darjeeling, the snowy Himalayas are visible and the majestic peaks of Mount Everest and Kanchanjunga. Out from Puri, southwest of Calcutta, at Konark stands the Sun Temple, the nation's most imposing monument to Hinduism, so generously decorated with carvings and statues that it has been described as "an inspired orgy of cultural magnificence."

In Delhi, capital of the republic, numerous monuments and ruins reveal a history of conflict and conquest. Among its unique attractions are the red sandstone and marble tomb of Humayun; the Juma Masjid, one of the world's largest mosques; and the Red Fort, with its richly painted ceilings and inlaid walls. At Agra, 170 miles distant, stands the beautiful and much-visited Taj Mahal. Those interested in Hinduism may wish to include in their itinerary Banaras on the left bank of the Ganga River, India's oldest and holiest city —a place of countless shrines, palaces and bathing ghats.

Kashmir, praised for centuries for its beauty, is India's most distinguished vacation area. Rivers, forests, flowering meadows and gem-like lakes encircled by white-capped mountains are elements of its exquisite landscapes. Beside Dal Lake lie the romantic Shalimar and Nishat Gardens. Around Pahalgam there are excellent camping sites. Gulmarg is a winter sports centre. Comfort-lovers find their amenities in summer resorts such as Simla, Mussoorie and Naini Tal.

All of the major cities of India can be reached by air, rail and road. The country has a wide network of airways. Its railway system is the second largest state-operated one in the world. Taxis and automobiles are available in the principal cities for road tours. In Canada information about travel in India may be obtained from the Information Service of India, to which we are indebted for the information in this column. The address of their office is 200 MacLaren Street, Ottawa 4.

In the Maritime Provinces

Prince Edward Island's annual Lobster Carnival will be held at Summerside 15-20 July. Its main attraction is one for gourmets—delicious fresh lobsters from Northumberland Strait, prepared for the table by expert chefs. There will also be a number of special diversions, including horse racing, speedboat racing, a fiddling and step-dancing contest, a track and field meet, and a soap box derby.

Last year's Fly Casting Tournament near Fredericton, New Brunswick, was so successful that it is being repeated this summer, 26-27 July. It will be open to professional and amateur casters and to women and children. The tournament is sponsored by the *Fredericton Daily Gleaner*, the Fish and Game Protective Association, and the New Brunswick Outfitters' Association.

For many years thousands of sports fishermen have been pitting their skill against the strength of tuna off the coast of Nova Scotia near Wedgeport, from early in July when the first of the fish are sighted till late September. Cape Island tuna boats accompanied by captains and guides and equipped with rods and bait are rented for about $50 a day. The season's sport culminates in the International Tuna Cup Match, when picked teams from various countries compete for the Sharp Trophy. This year the competition will be held 11-14 September.

From now until September Canadian National Railways are offering special family rates for travel to the Maritime Provinces.

Summer Program in Vancouver

An excellent program of concerts, plays and lectures is being given by the University of British Columbia Summer School and Festival of Arts throughout July and August. It includes a production of *The Tempest*, directed by Douglas Seale, and two operas, *The Medium* by Menotti and *Gianni Schicchi* by Puccini.

Ste. Adèle Art Centre

For the ninth year, *Le Centre d'art de Ste-Adèle* is offering courses in painting, sculpture, ceramics, ballet, tapistry weaving, jewelry making and French conversation for adults. There are also classes for children in painting, sculpture, ceramics and ballet. The centre will remain open until 17 August.

Holiday Accommodation in Britain

Accommodation in farmhouses and at places with special facilities for children in England, Wales and Scotland is listed in a booklet issued by the British Travel Association. It is arranged alphabetically under county headings. Copies may be obtained through the British Travel Association, 90 Adelaide Street West, Toronto.

AMONGST THE NEW BOOKS

British Columbia Geography Manual

Published by

British Columbia Department of Education, Victoria. $2.25.

Teachers of geography of Canada will be interested in this text-book prepared for British Columbia schools. The book is the text for an elective course in geography given at grades ten or eleven level in the province. There are three parts to the course and the text. Part I, thirty-three pages, deals with the physical geography of British Columbia, and includes the description of its landforms, drainage, climate, vegetation, soil and wildlife. Part II, human and economic geography, forty pages, summarizes information concerning the population, natural resources, transportation, manufacturing and recreation in the province. Part III, regional geography, thirty-seven pages, brings together the physical, human and economic factors in studies of seven geographical regions of British Columbia. The appendix has a list of articles on British Columbia which have appeared in the Canadian Geographical Journal, 1940-1953.

(*Continued on page IX*)

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(Continued from page VIII)

Information for the book was prepared by a group of geography and social studies teachers during a summer workshop at the University of British Columbia, directed by Inspector C. I. Taylor. The material was later edited and rewritten by Professors John D. Chapman and J. Lewis Robinson of the Geography Department at the university. The twenty-nine full-page maps were prepared by graduate-student cartographers of the university's Geography Department.

The book is too brief to be a full text on the geography of British Columbia, and is supplemented by information available locally to provincial teachers. For teachers in other provinces and states, however, the book should be useful as the first modern summary of the geography and resources of British Columbia.

J. L. R.

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The Tlingit Indians

by Aurel Krause

Translated by Erna Gunther

(University of Washington Press, Seattle. $4.50)

Die Tlinkit-Indianer, published in Jena in 1885, has long been out of print and is not readily available. It is one of those books which most anthropologists and geographers have known about, and which many of us have looked into, but which few except specialists in the ethnology of northern British Columbia and Alaska have actually read. Thus, in effect, this is a new book.

The importance of Krause's *Tlingit Indians* is not so much in its presentation of data that are new or little known, but rather in the type of material. Ethnologically the northwest coast is one of the best known areas of the New World. Boas, Swanton, Barbeau, Saper, Drucker, Linton and others have published monographs and articles on different tribes in the last sixty years, and we have detailed studies on social structure, language, secret societies, rank, and mythology — so that one might expect a volume on yet another tribe, the Tlingit, would merely add more facts in a specific area. But there is a significant difference. Krause and his brother were in Alaska when native culture was still dominant; ethnologists of the last generation, or of the present, have been describing native cultures that were already passing away. Much of their information came from the memories of the older people; what they actually observed was already in a state of decay.

Aurel Krause and his brother were sent by the Geographical Society of Bremen to Alaska in 1881, and returned to Germany in 1882. Aurel spent the winter 1881-2 at Chilkoot on the Lynn Canal among the Tlingit, observing, participating in the activities of the natives, and recording what he saw with the objectivity of a scientific observer. It is in the details of daily life that his record is valuable. He comments (p. 106) on the smoke within the house, on the kind of firewood, and of the way in which the natives squat or lie close to the scorching heat. Likewise he illustrates (p. 147) such objects as daggers and trigger-release-pins for fox-traps, and (p. 129) fishing gear. Most of these objects were decorated with characteristic totemic art forms. Comparable material from collections made in the last century is found in many museums, but rarely with adequate descriptions. And few investigators of this century have seen such objects in use.

Although Krause's work is particularly valuable for his own observations, he was a meticulous scholar who had read with care the earlier descriptions of Russian, English, and American explorers. His quotations are apt, and he is quick to comment on discrepancies. One chapter is essentially historical, with a very thorough treatment of Russian influence in Alaska. Dr. Gunther, herself an expert of North-West Coast Indian ethnology, has added extensive foot-notes to material published since Krause's time.

Few parts of the world have changed as profoundly in the last seventy years as Alaska. Krause's description of native life is a graphic contemporary picture of a life that has gone completely, and supplements the reconstructions of present-day anthropologists.

T. F. McIlwraith

Dr. T. F. MacIlwraith is head of the Department of Anthropology at the University of Toronto.

* * *

Collins-Longmans Study Atlas

(Longmans, Green and Co., Toronto, $2.00)

This is the tenth edition of this well-known book but it includes so many additions and alterations that it is virtually a new work. It includes much more than is usually found in atlases for, of the 152 pages, less than half are exclusively devoted to "standard" coloured maps. The remainder of the pages are taken up

with the index to the maps and two special features. These are the series of over 1,600 study exercises and the eight plates of twenty-six photographs in full colour which illustrate geographical aspects that cannot adequately be expressed on maps.

The exercises are "designed to help the student to become familiar with the uses of the atlas and to extract from it with confidence more of the great amount of information it can provide". They are in two sections. The first, which precedes the maps and photographs, deals with many fundamental geographical principles. The second follows the maps and photographs and deals principally with the separate regions and nations of the world. Quite apart from their primary usefulness, they include many black and white maps and diagrams and tabular statistical data.

On all the physical maps a uniform system of colour layering is used to facilitate comparisons. Equally praiseworthy is the clarity which has been achieved by printing the rivers in blue. Confusion with names and railways has also been reduced by either printing the contour lines in colours other than black or by omitting them between layer tints. Some of the maps are visually very attractive. Among these are a series of "special and precise agricultural, industrial and occupational maps" of Great Britain. These include an interesting compilation of the Land Utilization Survey of Britain entitled "Town, Farm and Moor". Other sheets, in contrast, are rather crudely printed. Not only does the colour registration leave much to be desired but the colours themselves are rather too bold for this writer's tastes.

But such comments are perhaps unjustified in view of the relatively low price for the volume. It is difficult to think of any other single source of so much authentic information and so many aids in the teaching of geography which is available for two dollars. *The Study Atlas* can be used as a basic book for all school geography but its use would be especially valuable in those schools whose financial resources strictly limit the purchase of geographical materials.

N. L. NICHOLSON.

Dr. Norman Nicholson is director of the Geographical Branch of the Department of Mines and Technical Surveys at Ottawa and is a member of the committee on land utilization of the Conservation Council of Ontario.

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